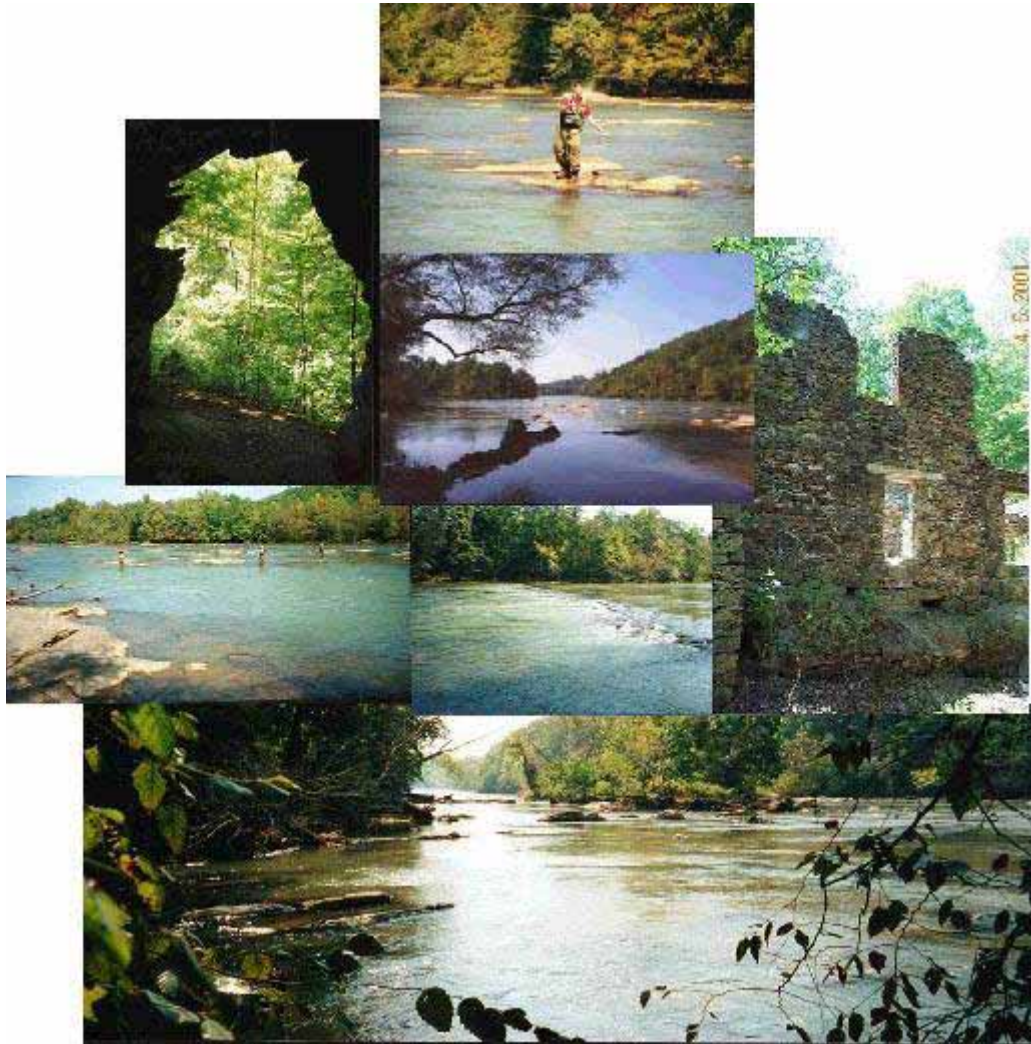


AFFECTED ENVIRONMENT



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AFFECTED ENVIRONMENT

NATURAL RESOURCES

This section describes the characteristics of the existing natural environment that could be affected by the proposed action alternatives and the no action alternative (continue current management). In compliance with the guidelines contained in the National Environmental Policy Act and Section 1502.15 of the regulations for implementing that act developed by the Council on Environmental Quality (1978), the description of the affected environment focuses on only those environmental aspects potentially subject to the effects resulting from the proposed park access and development policies.

As discussed in the "Purpose and Need for the Plan" section, the National Park Service has identified impact topics that may be affected by the proposed actions or the no action alternative (continue current management). This section establishes the basis for the "Environmental Consequences" section, which assesses the effects that the alternatives may have on the impact topics within the affected environment.

Air Quality

Air quality is included as an impact topic based on the criteria presented in "Impact Topics – Resources and Values at Stake in the Planning Process" in the "Alternatives" section. The specific concerns related to this impact topic are discussed in the "Environmental Consequences" section.

The park is located within one of the most rapidly developing areas in the United States. As a result, metropolitan Atlanta air emissions generated by the large volumes of cars, trucks, and airplane traffic in Atlanta have affected the air quality of the park in various ways.

The United States Environmental Protection Agency has established primary and secondary national ambient air quality standards for criteria pollutants under the provisions of the Clean Air Act. Primary national ambient air quality standards establish levels necessary, with an adequate margin of safety, to protect the public health. Secondary

national ambient air quality standards specify the maximum allowable levels of air pollution to protect the public from any known or anticipated adverse effects associated with air contaminants.

Federal ambient air quality standards for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, respirable particulate matter smaller than 10 microns, and lead are summarized in Table 6. Vehicle emissions are the primary source for these pollutants. Areas not in compliance with the national ambient air quality standards are termed "non-attainment" areas. Attainment of the national ambient air quality standards is determined through continuous ambient monitoring. Thirteen counties surrounding the park, including Cobb, Gwinnett, Fulton, and Forsyth counties, are collectively designated a "non-attainment" area due to ozone violations.

Ozone is of particular concern in the Atlanta metropolitan area. It is a highly reactive compound formed by a series of complex photochemical reactions when volatile organic compounds and nitrogen oxides are subject to intense sunlight. The national ambient air quality standards for ozone are based on the expected number of days per year with a one-hour concentration of 0.12 parts per million or greater. The 1990 Clean Air Act Amendments specify five classifications of non-attainment for the one-hour ozone standard: marginal, moderate, serious, severe, and extreme. The Atlanta area has not met the national ambient air quality standards for ozone since monitoring began in 1980. In 1992, the 13-county region encompassing the Atlanta metropolitan area was designated as a "serious" non-attainment area under Section 181 of the Clean Air Act.

Current air quality in Atlanta, including the park, is monitored by the Georgia Environmental Protection Division Air Protection Branch through a network of fourteen monitoring sites, including seven that monitor ozone. Measurements made between 1995 and 1999 show that the Atlanta area continues to achieve compliance with the national ambient air quality standards for all six criteria pollutants except for ozone (Table 6).



**Table 6: National Ambient Air Quality Standards
and Maximum Monitored Ambient Concentrations
in Atlanta for 1995 through 1999**

Pollutant	Averaging Time	Primary Standard ^b
Ozone	1 hour	0.12 parts per million
Carbon monoxide	1 hour	35 parts per million
	8 hour	9 parts per million
Nitrogen dioxide	Annual	0.053 parts per million
Sulfur dioxide	3 hour	0.5 parts per million (a)
	24 hour	0.14 parts per million
	Annual	0.03 parts per million
Respirable particulate matter smaller than 10 microns	24 hour	150 micrograms per cubic meter
	Annual geometric mean	50 micrograms per cubic meter
Lead	Calendar quarter	1.5 micrograms per cubic meter

Source: U.S. Environmental Protection Agency National Primary and Secondary Ambient Air Quality Standards (40 CFR 50)

Pollutant	Averaging Time	Maximum Monitored Ambient Concentrations ¹	Year of Occurrence	Exceeds Standard
Ozone	1 hour	0.157 parts per million	1999	Yes
		0.158 parts per million	1998	Yes
		0.135 parts per million	1997	Yes
		0.142 parts per million	1996	Yes
		0.166 parts per million	1995	Yes

Source: U.S. Environmental Protection Agency 1999

Under an interagency agreement, the National Park Service- Air Quality Division provides technical assistance on prevention of significant deterioration permit application reviews, air quality monitoring and modeling, and other air quality related responsibilities specified by the Clean Air Act.

The prevention of significant deterioration program established three air quality classes (I, II, III) for areas with air quality better than national ambient air quality standards (attainment areas). The

park is located within an area designated as Class II.

Each class has defined limits on the allowable increase (increments) in particulate matter, nitrogen dioxide, and sulfur dioxide. Class I areas have the highest level of protection from air pollutants, with very little deterioration of air quality allowed in these areas. Moderate deterioration, associated with well managed growth, is allowed in Class II areas, while more deterioration is allowed in Class III areas. There are no Class III areas identified within the United States.



Water Resources

The Chattahoochee River and its tributaries are included as an impact topic based on the criteria presented in “Impact Topics – Resources and Values at Stake in the Planning Process” in the “Alternatives” section. The specific concerns related to this impact topic are discussed in the “Environmental Consequences” section.

The river is the primary natural feature within the park. Within the park boundaries, the Chattahoochee River flows 48 miles from Buford Dam near Sugar Hill to the confluence with Peachtree Creek in Atlanta. Land uses within the watershed include urban, suburban residential, agricultural, and forested areas.

The National Park Service prepared *Water Resources Management Plan Chattahoochee River National Recreation Area, Georgia* in June of 2000 (NPS 2000e), summarizing the water-related resource issues in the park. This reference has served as the primary source of information for water resources issues discussed in this section, which include surface water hydrology, water supply, water quality, and aquatic resources.

Surface Water Hydrology and Watershed Characteristics

The surface water hydrology of the Chattahoochee River is largely determined by the geological setting and processes that have formed the watershed. The river within the park is located within the Piedmont Province, Southern Piedmont Section, Upland Georgia Subsection, flowing along the Brevard Fault in a northeast to southwest direction within the Gainesville Ridges District. This district is characterized by “a series of northeast-trending, low, linear, parallel ridges separated by narrow valleys” (Clark and Zisa 1976). The ridge formations and Brevard Fault result from forces associated with continental drift. Faulting produced the “Palisades” cliffs, located in the extreme southern end of the park. The Palisades were the original basis for designating the park as a National Recreation Area.

This geological setting produces a relatively long and narrow watershed, surrounded within the vicinity of the park by rapidly developing urban and

suburban areas. These features channel a large amount of nonpoint runoff into the river in this narrow watershed during storm events, affect park characteristics, especially water quality (refer to the “Water Quality” subsection for additional information).

The portion of the Chattahoochee River watershed encompassed by the park, extending from river mile 348.3 at Buford Dam to river mile 300.5 at Peachtree Creek, drains 416 square miles below Buford Dam. The major tributaries and watersheds associated with the park are listed in alphabetical order in Table 7 and shown on the Water Features map in sequence from north to south (NPS 2000e):

Table 7: Named Creeks within Chattahoochee River National Recreation Area (with Watershed Area in Square Miles for Dominant Water Bodies)

Arrowhead Creek
Bagley Creek
Ball Mill Creek (3.5)
Bennett Creek
Bentley Creek
Big Creek (also known as Vickery Creek) (103)
Bishop Creek
Brushy Creek
Bull Sluice Lake
Camp Creek Cauley Creek
Caney Creek
Cheatam Creek
Cobb Creek
Crooked Creek (9.2)
Daves Creek
Dick Creek (8.8)
Foe Killer Creek
Fox Creek
Gumby Dreck
Harris Creek
Haw Creek (3.8)
Heards Creek
Hog Wallow Creek



Table 7: Named Creeks within Chattahoochee River National Recreation Area (with Watershed Area in Square Miles for Dominant Water Bodies)

Ivy Creek
James Creek (10.6)
Johns Creek (13.1)
Kelly Mill Branch
Level Creek
Little Ivy Creek
Long Indian Creek
Long Island Creek (19.6)
March Creek (5.3)
Mill Creek
Morgan Falls Dam
Mullberry Creek
Nancy Creek
Nannyberry Creek
Owl Creek
Peachtree Creek (131)
Poorhouse Creek
Richland Creek (15.2)
Rottenwood Creek (6.4)
Sawmill Branch
Seven Branch Creek
Sewell Mill Creek
Sibley Creek (aka Terrel Mill Branch)
Seven Branch
Sope Creek (35.4)
Suwanee Creek (51.2)
Terrel Mill Branch (see Sibley Creek)
Vickery Creek (see Big Creek)
Unnamed Creek (3.7)
Willeo Creek (19.8)

Source: NPS 2000e

* Creeks bordered at least in part by Chattahoochee River National Recreation Area parcels are bolded.

The majority of these tributaries flow through urban or suburban areas subject to excessive amounts of nonpoint runoff. Numerous minor tributaries

and groundwater springs also drain to the Chattahoochee River within the park.

The flow of the river is dominated by controlled releases from Buford Dam, which was constructed in 1957 and is managed by the Mobile District, United States Army Corps of Engineers. Flow is also affected significantly by storm events, which contribute large amounts of water to the river via overland flow and major tributaries. Volumes range from less than 750 cubic feet per second to over 8,400 cubic feet per second during power generation (NPS 2000e). The Corps of Engineers is required to maintain a minimum flow of 750 cubic feet per second at all times to maintain water quality and protect aquatic life in the river.

Releases provide electrical power during peak demand periods. These surges create rapid and large changes in water levels and velocities downstream of Buford dam. Water levels immediately below Buford Dam, for example, can change up to 5 feet in less than an hour. These surges, which are noticeable within the park, become less noticeable farther downstream (NPS 2000e). The surges have resulted in significant erosion of the riverbanks for as far as 20 miles downstream, significant widening of the river, and increased numbers of trees falling into the river (NPS 2000e).

Key facts summarizing the flow regime in the river are as follows (NPS 2000e):

Drier years are characterized by lower than average streamflows

Wetter years produce high flows that are two to three times higher than high flows in dry years

Higher flow periods follow seasonal patterns, i.e. higher flows occur during storms in July

Lower flows usually occur in the autumn

Mean annual discharge at the Norcross station over the last 85 years has been 2,289 cubic feet per second

Mean discharge at Buford Dam from 1988 to 1997 was 2,139 cubic feet per second, and median discharge was 1,420 cubic feet per second



The Buford Dam outlet has a maximum capacity of 11,600 cubic feet per second

The lowest flow in the river for the historical record was 296 cubic feet per second, recorded in September, 1957

The two largest tributaries within the park are Big Creek (mean daily discharge of 108 cubic feet per second) and Suwanee Creek (mean daily discharge of 67 cubic feet per second). The five highest peak flows for these two creeks range from 2,410 to 3,970 cubic feet per second for Big Creek and from 2,150 to 4,350 for Suwanee Creek

Morgan Falls Dam, located at river mile 312.6, was constructed from 1902 to 1904, and created Bull Sluice Lake, the only lake within the park. This very shallow lake has rapidly filled with sediment, due to the large amount of suspended solids entering the river from nonpoint runoff. The lake is being invaded by cattail marshes that form extensive wetlands. Bull Sluice Lake is one of the more dramatic areas of the park, with cliffs of over 200 feet high rising on the east side of the lake opposite Gold Branch.

Water Supply

The majority (99 percent) of all municipal and industrial water use in the Atlanta area comes from surface water (NPS 2000e). Approximately 70 percent of the water supply is taken from the Chattahoochee River and approximately 10 percent directly from Lake Lanier (NPS 2000e). The remaining water comes from other sources, including groundwater wells. The Atlanta metropolitan area, including Gwinnett, Fulton, DeKalb, and Cobb Counties and the City of Atlanta, are thus heavily dependent on water from the river for their drinking water supply.

In 1988, the release patterns of water from Lake Lanier were changed by the United States Corps of Engineers to "enhance water supply availability" (NPS 2000e). This change included reallocating approximately 20 percent of the release from hydropower production to water supply (NPS 2000e).

Approximately 671 million gallons per day of treated water is added back to the river within the

park by eight wastewater treatment plants within four counties. Approximately 446 million gallons per day are withdrawn from the Chattahoochee River for drinking water and industrial use. The projected municipal and industrial demand for 2050 is 494 million gallons per day (NPS 2000e). Twelve Environmental Protection Division-permitted users (those that withdraw more than 10,000 gallons a day) withdraw additional amounts of water from the river for other uses (NPS 2000e). These users include golf courses, athletic clubs, and small industries (NPS 2000e).

Severe droughts in 1981, 1986, and 1988 brought the water supply issue to the forefront in the Atlanta region. Legal actions between Georgia, Florida, and Alabama produced the ongoing Tri-State Water Allocation program. The program is managed by the Apalachicola- Chattahoochee- Flint River Compact Commission, which was assigned the role of developing a Water Allocation Formula for the Chattahoochee River, including the park. Alabama, Georgia and Florida approved Interstate Compacts in 1997. The objective of the compact program is to provide an equitable basis for sharing of water supplies between the users.

The commission instituted the Alabama- Coosa- Tallapoosa / Apalachicola- Chattahoochee- Flint River comprehensive study in 1991 to address the water supply issue. The objectives of this study were to: (1) make water use demand estimates through 2050; (2) estimate the ability of supplies to meet demands; and (3) develop water supply management alternatives. This process is still underway.

A draft National Environmental Policy Act programmatic environmental impact statement was also prepared and released by the United States Corps of Engineers, Mobile District in conjunction with the comprehensive study (United States Corps of Engineers 1998). This document addressed the issues associated with implementing a range of low, moderate, or high flow conditions that could potentially result under a given water allocation formula. This approach was designed to bracket potential future flow regimes. The document is programmatic in that it does not assess impacts of a particular water supply reservoir or group of reservoirs. Instead, the objectives of the programmatic environmental impact statement



were to: (1) provide an evaluation framework that could be used to tier to future, site- specific environmental impact statements on actual proposed water supply reservoirs, and (2) using the bracketing approach, assess potential effects of a range of flow conditions on water quality, aquatic life, recreation, fishing, and water supplies.

Because the park is located immediately below Lake Lanier, the potential effects of the Tri- State Compact on the amount of water that will be available within the park are potentially significant. To a great extent, future flows in the Chattahoochee River will be dictated by the Tri- State Compact. The United States Corps of Engineers, Mobile District will prepare an environmental impact statement on the decision, after which specific impacts on the park can be identified.

Issues that continue to be negotiated as part of the Tri- State Compact and the Water Allocation Formula are:

- The minimum flow requirements at state lines and the Flint River
- Georgia water demand projections
- Drought contingency plans
- State sovereignty (in- state requirements)
- Different in- lake trigger elevations (rule curves)
- Unilateral modeling
- Discharge requirements placed upon new reservoirs
- Interbasin transfers

Clearly, these future decisions made regarding the water allocation formula will have a major effect on the park.

Water Quality

Water quality of the Chattahoochee River and tributary streams within the park has been and continues to be affected by various pollution sources. Although the Chattahoochee River within the park does have water quality problems and issues as described in this section, the Georgia River Care 2000 assigned an “outstanding” rating to that segment of the river, based on the assignment of

this mainstem section of the river as a secondary trout stream. A secondary trout stream is one that is capable of supporting trout throughout the year, but which does not support naturally reproducing populations. This rating is currently being reassessed by the Georgia Environmental Protection Division in view of the recent finding of naturally reproducing brown trout in the upper portion of the Chattahoochee River within the park (refer to the “Aquatic Resources of the Chattahoochee River” subsection).

Water quality in the Chattahoochee River and tributary streams within the park is protected under law by Georgia’s water use classifications and standards, applied to Georgia’s interstate waters in 1972 (Appendix B). These regulations include standards for fecal coliform bacteria, dissolved oxygen, pH and temperature of drinking water, recreation, and fishing. Generalized visual water quality criteria also apply to the park. The Georgia Rules and Regulations for Water Quality Control, Chapter 391- 3- 6- .03, Water Quality Standards, established standards for toxic materials, including metals and other inorganic compounds, toxic priority pollutants, pesticides and herbicides.

Section 303(d) of the Clean Water Act requires states to list their waters not supporting their designated uses; that is, not meeting water quality standards for those uses. This list is referred to as the 303(d) list and includes an assessment of the water quality conditions, the extent and causes of documented violations, and the actions being taken to correct the water quality problems. The Georgia Environmental Protection Division has placed a 12- mile segment of the Chattahoochee River between Morgan Falls Dam and Peachtree Creek on the 2004 303(d) list as only partially supporting its designated use as recreation and drinking water, due to elevated levels of fecal coliform bacteria and violations of appropriate fish consumption guidelines. According to the 303(d) list, the Environmental Protection Division is addressing the urban runoff in its stormwater management strategy for metropolitan Atlanta.

The area- wide stormwater permit was last reissued in 1999. The fish consumption guidelines were violated due to polychlorinated biphenyls. However, polychlorinated biphenyls were banned in the



United States in 1976, and levels have since declined.

For each water body that does not meet the water quality criteria required by its respective designated uses, the state must develop a total maximum daily load for the pollutant of concern to ensure that applicable water quality standards can be attained and maintained. Total maximum daily load is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards. This is the sum of point source loads and nonpoint source loads, plus a margin of safety. The objective is to allocate allowable loads among different pollution sources so that appropriate control actions can be taken to achieve water quality standards. Tools used to meet total maximum daily load requirements include best management practices, regulations, land acquisition, infrastructure investment, and pollutant trading. A total maximum daily load was developed for polychlorinated biphenyls in fish tissues for seven segments of the Chattahoochee River, including Morgan Falls to Peachtree Creek, in January 2003 by the Environmental Protection Division.

Section 305(b) of the Clean Water Act requires each state to submit an annual report that identifies waters in the state that do not meet their designated uses. Waters of the Chattahoochee River within the park are designated as suitable for “drinking water, recreation, and fishing”. However, many tributary streams in the park do not meet these designated uses, as shown in Appendix B. This is due to several sources of pollution, including the following (NPS 2000e):

Wastewater treatment plants: The quality of wastewater discharged to the river has improved over the last 20 years due to improved treatment plant technologies. These discharges are controlled under the National Pollutant Discharge Elimination System program by the State of Georgia. Six major wastewater treatment plants discharge over 189 million gallons per day. Of this total, 140 million gallons per day are contributed by two plants at the lower end of the park, and 49 million gallons per day are discharged within the rest of the park (NPS 2000e).

Sewer pipelines: The National Park Service recently mapped the extensive network of sewer pipelines are located within the park and the watershed surrounding the park (NPS 2001c). Many pipelines go through the park under easement agreements with local governments. Some lines, especially older lines that cross small- or medium- size tributaries, have experienced leaks and breaks due to action by flowing water and abrasion of sediments. In 1999, Georgia Environmental Protection Division records showed that approximately 26 million gallons of raw or partially treated sewage were spilled into the Chattahoochee River and its tributaries within the park. The park maintains a database of spills of sewage and other materials.

Combined Stormwater Sewer Overflows and Wastewater Sewer Overflows: Older wastewater collection systems combine stormwater and wastewater sewer discharges, and periodically experience overflows during storms. In modern water collection and disposal systems, stormwater and wastewater flows have been separated. However, many wastewater sewer overflows have occurred within the park in the Atlanta area. These have been observed to blow manhole covers off, resulting in direct releases to the river and its tributaries (NPS 2000e).

Spills of other materials: Accidental spills of fuel and numerous other chemicals have occurred on bridges crossing over the Chattahoochee River or other nearby roads within the park. The park tracks the types and quantities of materials released to the river in a spills database. Local or state emergency response teams handle the cleanup of these spills.

Nonpoint Runoff: Runoff of stormwater from impervious and exposed surfaces in urban and suburban areas contains suspended solids, trace metals, organic compounds, and various pathogens. Impervious surfaces include roads, parking lots, and rooftops. Cleared construction sites are a primary source of suspended solids. Under the new National Pollutant Discharge Elimination System construction stormwater permit system, the Georgia Environmental Protection



Division regulates discharges of stormwater from construction sites greater than 5 acres. Despite these controls, approximately 80 percent of all water pollution in the area comes from nonpoint sources in developed areas. Increased runoff also causes increased flooding, streambed scouring, sedimentation, bank erosion, and accumulation of litter and other solid waste.

As discussed in the “Social and Economic Environment” subsection, the Atlanta area is one of the most rapidly growing areas in the country. As a result, nonpoint pollution has increased greatly over the last 20 years. If not controlled, problems associated with nonpoint pollution are expected to continue to get worse. The four county governments that surround the park have instituted a series of watershed studies designed to assess water quality problems and develop solutions in the form of best management practices that will allow each county to meet its total maximum daily load restrictions for the major water quality parameters of concern: fecal coliform bacteria, total suspended solids, and nutrients. The majority of these multi-year programs are currently in the initial problem identification phase (watershed assessment).

The following is a summary of specific water quality issues associated with the Chattahoochee River and tributaries within the park:

Fecal Coliform Bacteria: These bacteria can deplete water of oxygen, killing fish and other aquatic wildlife. They also can indicate the presence of other harmful microorganisms, including those that can cause typhoid fever, hepatitis, gastroenteritis, dysentery and ear infections. Failure to meet the fecal coliform standard is the most commonly listed cause of non-support of designated uses in the park and the Atlanta region.

Elevated fecal coliform levels have been recorded in the majority of streams within the park and the Chattahoochee River, due primarily to nonpoint runoff, sewer line overflows, spills of raw sewage from sewer line breaks, and sewer line and septic system leaks. The park is surrounded by an extensive network of sewage lines, with several located inside the park. Domestic animals (cows, horses,

dogs) and wildlife (duck, geese) also cause direct bacterial contamination of the river and tributaries. Current fecal coliform levels are generally acceptable for fishing, but are only marginally acceptable or unacceptable for recreation (i.e., swimming) (NPS 2000e).

Water flowing from Buford Dam met the 200 mpn/100 ml standard (30-day geometric mean) consistently in a Georgia Environmental Protection Division 1995 survey (NPS 2000e). However, as the distance downstream increases, the percentage of samples meeting the standard steadily declines. In the lower quarter of the park, the 1995 Environmental Protection Division survey found that the standard was violated 100 percent of the time. The National Park Service, in cooperation with the United States Geological Survey and the Upper Chattahoochee Riverkeeper, has subsequently instituted a fecal coliform monitoring program called the BacteriALERT Program. Information is posted on the Internet at <http://ga2.er.usgs.gov/bacteria>. BacteriALERT results are also posted at all major water access points within the park. Samples are collected daily at three park locations: Medlock Bridge, Paces Ferry Bridge, and Johnson's Ferry Bridge.

E. coli counts above 236 colonies per 100 mL of water are considered high risk. Contact with the river is not recommended due to documented risk of illness. The water quality also fails to meet federal recreation water quality standards.

The United States Geological Survey has completed a two-year ongoing study of the extent and severity of microbial contamination within the park. The study, initiated in 1999, is a watershed-based assessment that will provide a focus for future coordinated monitoring and protection efforts within the park. Analysis of data from 1986 to 1995 found no distinct upward historical trend in levels of fecal coliform bacteria. Fecal coliform values, however, vary widely between years and months. Every tributary in the park has experienced at least some elevated fecal coliform levels. As part of this project, ribosomal fingerprints (ribotypings) are also being used to distinguish human sources of fecal coliform bacteria from other animals. This technique involves matching of genetic fingerprints of *E. coli* in water samples to strains of *E. coli* from fecal material samples in the watershed. Analysis of



chemical sewage tracers is also being conducted to separate point and nonpoint sources of pollution.

Other Pathogens: Other pathogens occurring in the park that can cause human illness include various species of bacteria, viruses, and protozoans. Examples include the protozoans *Giardia* and *Cryptosporidium*, which can be very debilitating and even life- threatening for very young or very old people (NPS 2000e). Other examples include intestinal bacteria, eye, ear nose and throat bacteria, and enteric viruses (NPS 2000e).

Metals in Water and Sediments: Some tributary streams in the park are characterized by elevated levels of lead, copper, zinc, or cadmium associated with urban and suburban runoff or from wastewater and industrial sources such as batteries, metal products, industrial discharges, and stack emissions. Metals were the second most common pollutants of concern after fecal coliforms in the Environmental Protection Division's 1994- 1995 water quality assessment of the Chattahoochee River tributaries (NPS 2000e). Metals accumulate in aquatic food chains and can harm aquatic animals as well as humans.

Metals also enter the park from the bottom water and sediments of Lake Lanier via releases from Buford Dam. In summer, the lake becomes vertically stratified with a pronounced layer of cold, oxygen- deficient water near the bottom (called a hypolimnion). Under these low- oxygen or zero- oxygen conditions, metals from lake sediments dissolve in the water column and become available for uptake by aquatic organisms. As a result, high levels of iron and manganese are commonly found in the tailwater area below Buford Dam. Levels are usually highest during December to February, just following vertical mixing (NPS 2000e).

The streams in the park, listed in Table 8, were found not to meet their designated use because of elevated levels of metals (NPS 2000e):

Levels of metals in Lake Lanier are also elevated due to various existing and historic industrial sources (NPS 2000e). Zinc, copper, and lead enter the lake from industrial sources industrial sources along the Chattahoochee River above Lake Lanier. The lake only partially supports its designated use

because of elevated levels of mercury and lead in some areas (NPS 2000e).

Table 8: Streams in the Park That Do not Meet Their Designated Uses because of High Levels of Metals

Stream	Classification	Metals Problem
Tributary to Sope Creek	Fishing	Elevated cadmium, copper and lead; Source is believed to be industrial sites
Sope Creek	Fishing	Elevated lead
Rottenwood Creek	Fishing	Elevated lead
Willeo Creek	Fishing	Elevated lead

Source: NPS 2000e

Water Temperature: Higher temperatures in the river and tributary streams caused by sediment suspended in the water introduced from nonpoint runoff, loss of shade trees along streambanks, and wastewater discharges cause reductions in dissolved oxygen levels. During March through September, release of cold hypolimnetic water from Lake Lanier for power generation cools the river at the upper end of the park. During December and January, the release of warmer vertically mixed water to the river causes a mid- winter warming effect (NPS 2000e), reversing the pattern expected in a free flowing river.

Dissolved Oxygen: The daily average dissolved oxygen standard is 5.0 mg/L, and the minimum standard at any time is 4.0 mg/L. Water released from Buford Dam characteristically has lower levels of dissolved oxygen, especially during summer releases from the deeper levels of the lake. However, re- aeration in shoals and vertical mixing in pools raises dissolved oxygen levels in the majority of the river within the park above the minimum 6.0 mg/L level desirable for trout streams (NPS 2000e).

In the past, point- sources of wastewater from treatment plants introduced large quantities of oxygen- demanding organic material to the river. With improved treatment systems, however, these sources have been greatly reduced. In the 1960s



and 1970s, dissolved oxygen levels generally ranged from 4 to 5 mg/L, and readings of 0 mg/L were not uncommon (NPS 2000e). Levels of dissolved oxygen in the river have increased from the 1970s until present. In the 1990s, dissolved oxygen levels south of Atlanta have usually been 5 to 9 mg/L or higher, with essentially no occurrences of 0 mg/L (NPS 2000e). A recent study by Georgia Environmental Protection Division showed that between 1986 and 1995, dissolved oxygen levels at the three water intakes farther south on the river within the park were all at greater than 80 percent saturation, exhibiting little annual variation (NPS 2000e). Dissolved oxygen levels in the tributaries of the Chattahoochee River between 1993 and 1995 were also acceptable, based on a study by Environmental Protection Division (NPS 2000e).

Low dissolved oxygen remains a problem in the tailwater of Lake Lanier. In response, the United States Corps of Engineers is planning to replace the turbines in Buford Dam to allow direct turbine venting. This will allow aeration of the water released from Lake Lanier prior to discharge to the river. This project, scheduled for completion in 2006, should eliminate problems with the release of water with low dissolved oxygen levels from the hypolimnion of Lake Lanier. This condition has the potential for releasing trace metals such as iron, copper and manganese which become soluble under conditions of low oxygen and low pH that occur when a lake is stratified (Wetzel 1975). These metals are currently released in the hypolimnion at Lake Lanier and released to the tail water, where they have a potential to adversely affect aquatic life. Adding oxygen to the turbine water will cause these metals to precipitate and enter the sediments below the dam, making them much less available to aquatic life.

Erosion/Sedimentation: Runoff during storms carries sediment from construction sites and impervious surfaces such as roads, parking lots, driveways and rooftops into the Chattahoochee River and tributaries. This raises the levels of suspended solids in the water, increasing the turbidity levels. Elevated turbidity and sediment levels are common in streams and the Chattahoochee River in the park, especially after storm events. Suspended sediments have an adverse impact on aquatic life directly by clogging fish gills and filling in benthic habitat in pools and riffles. Elevated tur-

bidity also increases stream temperatures and lowers dissolved oxygen levels. Sediment particles carry pesticides, herbicides, metals, and grease and oil into receiving streams and the river.

Nutrients: Nutrients such as nitrates, phosphates, and organic loads are flushed into the river from lawns, domestic animal sources, and exposed soil at construction sites (NPS 2000e). This can stimulate blooms of nuisance algae, leading to reduced dissolved oxygen levels. Wastewater treatment plants also introduce nutrients into the river and its tributaries. Spills, overflows, and leaks from sewer lines located in the watershed can introduce nutrients to receiving waters.

Generally, nitrate and nitrite levels in the Chattahoochee River increase as a function of increasing distance downstream due to introduction of treated wastewater and nonpoint runoff (NPS 2000e). Lawn fertilizers are a major source of nitrogen in nonpoint runoff. Nitrate levels in the main river channel are relatively low, typically well below the 10 mg/L level recommended for drinking water (NPS 2000e).

Because plant production in most aquatic systems is limited by availability of phosphorus, this nutrient that can significantly affect the quality of aquatic systems. If too much phosphorus is introduced, algal blooms and reduced dissolved oxygen levels can result. In the Chattahoochee River, total phosphorus loadings have decreased over the past 20 years as treatment plant effectiveness has increased and due to the ban on phosphorus detergents in 1990.

Nutrient levels in the tributaries of the Chattahoochee River account for over 60 percent of the total nutrient loading to the river, according to the United States Geological Survey (NPS 2000e). In urban watersheds such as those in the lower part of the park, over 80 percent of the nutrient runoff occurs during storm events (NPS 2000e). These conclusions are supported by specific conductance data collected in the river and tributaries within the park by the Atlanta Regional Commission (NPS 2000e).

Nutrient studies have also been conducted as part of several county-sponsored watershed assessments in the park area. These have included as-



assessments of Johns Creek, Rottenwood Creek, Sope Creek, Willeo Creek, and Cauley Creek. The results support the overall conclusion that water pollution in the area primarily arises from nonpoint sources.

Pesticides and Herbicides: Pesticides and herbicides from lawn treatment and agricultural activities enter area streams and the Chattahoochee River, with potentially detrimental effects on aquatic life. Concentrations of insecticides often exceed the criteria to protect aquatic life (NPS 2000e). Pesticide levels are generally below existing drinking water standards, however.

Herbicides are used within the park watershed to control weeds in lawns, for vegetation control along roadsides, and in commercial areas. Common herbicides used in the area include glyphosate, sulfometuron, benefin, bensulide, acifluorefen, 2,4-D, 2,4-DP, mecoprop, and dicamba (NPS 2000e).

Table 9 provides a recent summary of the number of acres of lawns estimated to be treated with pesticide in counties in or near the park (NPS 2000e):

Table 9: Number of Acres of Lawns Estimated to Be Treated with Pesticides in the Vicinity of the Park

County	Acres Treated
Cobb	20,300
Forsyth	2,620
Fulton	30,900
Gwinnett	6,080
Total	~ 60,000 (90 square miles)

Source: NPS 2000e

Approximately 80 percent of these areas are treated by homeowners. The remaining areas are treated by lawn-care companies.

Insecticides are used to control animal pests on golf courses, lawns, and gardens and in buildings. Organophosphate pesticides such as diazinon and chlorpyrifos have largely replaced organochlorine insecticides because the latter have been shown to accumulate in the food chain (NPS 2000e).

Because pesticides are applied at different stages of a plant's life cycle, pesticides appear in nonpoint runoff at different times of the year. Some are highest in the spring, whereas others are highest in December and February, depending on their use patterns (NPS 2000e).

The United States Geological Survey conducted a study of pesticides in several tributary streams in the park (NPS 2000e). The following is a summary of this information:

Sope Creek: Herbicides and pesticides were usually below the drinking water standard. Maximum concentrations of most insecticides tested and median concentrations of chlorpyrifos and diazinon exceeded guidelines for protection of aquatic life. Diazinon (used on turfs and ornamental plants) exceeded the aquatic guideline half the time.

Big Creek: Trace levels of seven herbicides and three insecticides were recorded within the park in Big Creek in 1994-1995. None of the three pesticides exceeded the guidelines for drinking water. Levels of pesticides approached or exceeded some existing guidelines for protection of aquatic life, however.

Suwanee Creek: Five herbicides and two insecticides were detected in two samples collected in May and July 1995. Diazinon levels were above the guideline required to protect aquatic life. Several turf herbicides were also detected.

Pesticides were detected in over half of the well and spring samples collected within the park in a United States Geological Survey study conducted in 1994-1995 (NPS 2000e). This study assessed three tributaries in the park and Atlanta area tributaries of the Chattahoochee River outside the park. Dieldrin, a termiticide and agricultural pesticide that is no longer on the market, was the most common pesticide detected in groundwater, occurring in 30 percent of the wells and 47 percent of the springs. Tetrachloroethene, used in dry cleaning operations, was found in one well and one spring. Radon exceeded the U.S. Environmental Protection Agency standard of 300 picocuries/liter in 87 percent of the groundwater samples.



Accumulation of Chemicals in Fish: Sampling of fish in the Chattahoochee River was conducted in 1995 by the Georgia Environmental Protection Division for 43 parameters, including pesticides, herbicides, polychlorinated biphenyls, and organic substances. Of the 43 parameters, levels of mercury, polychlorinated biphenyls, and chlordane above those recommended by the U.S. Environmental Protection Agency and State of Georgia for fish consumption have been measured in fish from some locations within the park (NPS 2000e).

The Environmental Protection Division recommended a set of fish consumption guidelines specifically for mercury, polychlorinated biphenyls, and chlordane in the Chattahoochee River from Buford Dam to Morgan Falls Dam, and a separate set of recommendations for the river below Morgan Falls Dam (NPS 2000e). These guidelines are revised annually based on ongoing sampling results. In the park, the U.S. Environmental Protection Agency has made special reference to polychlorinated biphenyls because of the potential for carcinogenic and other types of health effects, recommending a level of not more than 100 parts per billion in fish and stating that the need for a health advisory is “clear, particularly for children and pregnant and nursing mothers” (NPS 2000e). The agency has recommended further research and testing of sport and native fish and sediments, and investigations of landfills as possible sources of polychlorinated biphenyls.

Sand and Gravel Mining: Approximately 8 percent of the area within the park is subject to sand and gravel mining. The majority of this activity occurs in the vicinity of McGinnis Ferry Road, Abbotts Bridge, and Island Ford area. Most of the mined material is used for road construction in the Atlanta area. Because dredging is normally associated with adverse impacts on benthic invertebrates, fish, and water quality, the National Park Service conducted field studies to estimate the nature of the potential effects of sand mining on the Chattahoochee River (NPS 2000e). These studies have concluded that:

Abundance and diversity of fish increased at the majority of dredged sites, possibly due to increased habitat diversity and availability created by the dredging;

Higher numbers of trout in some areas (Rogers Bridge) may have been misrepresented because dredging occurred in areas stocked regularly by the state;

Removal of sand is generally beneficial to aquatic life, but removal of gravel and debris is detrimental to aquatic life, because these materials provide habitat for aquatic invertebrates;

Dredging causes temporary localized increases in turbidity; and

Dredging results in deeper, wider channels with different fish assemblages, primarily related to slower current velocities.

The study recommended that dredging be limited to sand and that it not allow removal of trees, gravel, or cobble, which are beneficial to fish and invertebrates. This approach would mitigate the heavy sediment loads and erosion associated with surface water runoff resulting from other activities. The net effect of dredging in this instance, therefore, is to partially restore natural conditions by removing the unnaturally high amounts of sediment from the river bottom.

Sand and gravel mining in the park is regulated by the United States Corps of Engineers under Section 404 of the Clean Water Act; the Metropolitan River Protection Act allows sand and gravel mining as long as the operations do not disturb the riverbank. The National Park Service issues a special use permit for these operations. The permitting process is under review by the National Park Service to determine if alternative approaches may be more suitable. The National Park Service also has the authority to place conditions on 404 permits issued by the Corps of Engineers and can veto these permits if a project appears to be inappropriate. This allows the National Park Service to control aspects of mining operations that might adversely impact water quality and aquatic life in the park (NPS 2000e).

Aquatic Resources

Aquatic resources in the Chattahoochee River include fish, benthic invertebrates, aquatic plants, and planktonic organisms (phytoplankton and zooplankton). Within the park, the characteristics



of aquatic populations are greatly affected by the patterns of releases of cold water from Lake Lanier and by the introduction of suspended sediment from nonpoint runoff during storms. Releasing the water in surges leads to scouring of the bottom, increased and variable current velocities, increased erosion and sedimentation of benthic habitats, vertical riverbank erosion, widening of the river channel, and changing floodplain dimensions.

Cold water and sedimentation, coupled with the surge pattern of releases, have had major effects on the abundance, diversity, and production of aquatic life in the river. Stocking of non- native species has also affected native aquatic life. Despite these influences, a variety of aquatic organisms exist in the river. For example, the Georgia RiverCare 2000 Assessment assigned an “outstanding” rating to the commercial and recreational fish resources of the Chattahoochee River between Lake Lanier and Peachtree Creek (Miller et al. 1998). A literature review conducted by the National Park Service (NPS 2000e) as well as interviews with local specialists show key characteristics of aquatic life in the river:

As a result of stream capture processes over geological time, the Chattahoochee River basin is a faunal break (i.e., sharp change in assemblage structure) for many species.

Sampling in the southern portion of the park conducted by Mauldin and McCollum (NPS 2000e) showed that bluegills, carp, and white suckers were the dominant fish. These species flourish in disturbed habitats characterized by high levels of turbidity, lower dissolved oxygen levels, and eutrophication.

The specific effects of regulated flow on fish abundance, distribution, and diversity has been studied extensively by various investigators (NPS 2000e). These studies have concluded that frequent and high flow variability has led to low habitat diversity and, subsequently, to lower fish population diversity. Shallow, slow shoreline habitats, which have been found to be the prime habitat for most fish species, are greatly reduced under these conditions. These conditions are typical of the Chattahoochee River within the park, due to the pattern of releases from Lake Lanier.

Recently, 39 species of fish have been recorded in the tributaries and main channel of the Chattahoochee River within the park (NPS 2000e). Data collected in the pre-urbanization, “unimpaired” period identified a total of 42 native and eight nonnative species of fish from the tributary waters of the Chattahoochee River in the Atlanta area (NPS 2000e). Hess et al. in 1981 collected 27 fish species in eight tributaries within the park (NPS 2000e), including a rare population of shoal bass. More recent studies by Couch et al. (NPS 2000e) and DeVivo (NPS 2000e) documented 25 fish species in three tributaries of the park (Sope, Rottenwood and Willeo Creek). Sunfish were the most common species, followed by combinations of minnows, suckers, and darters. Combining all three studies, a total of 35 fish species have been recorded in the tributaries of the park. This is less than the ideal number of 50 species that Couch et al. (NPS 2000e) indicated could potentially occur in the area based on Karr’s index of biotic integrity (NPS 2000e). The park has experienced an apparent loss of approximately 15 species in comparison with ideal conditions (NPS 2000e). Lists of fish collected from the park are published in the water resources management plan (NPS 2000e).

The cold water regime produced by releases from Lake Lanier has made it possible to maintain stocked trout fisheries within the park. The Georgia Department of Natural Resources Fish and Game Division operates this program, releasing approximately 100,000 brown trout and 150,000 rainbow trout to the river each year (NPS 2000e). Brook, brown, and rainbow trout have been continually stocked since 1957 (NPS 2000e). From Buford Dam to Roswell Road, the fishery is managed as a year- round put- and- take fishery by stocking 9- inch brown and rainbow trout (NPS 2000e). The area between Morgan Falls and Peachtree Creek is managed as a “put- grow- and- take” fishery by annually stocking 3- inch brown and 6- inch rainbow trout. No viable warm water fishery is maintained in the park because of the low water temperatures (NPS 2000e).



Natural reproduction of brown trout has been observed recently on gravel bars below Buford Dam and in the upper parts of the river (Scalley 2001). This finding may affect the way the river is managed by the National Park Service and Georgia Department of Natural Resources, as the river could be reclassified as a primary trout fishery.

The river below Morgan Falls Dam/Bull Sluice Lake is affected by warm water episodes, in which the temperature is greater than 23 degrees Celsius. These conditions typically occur after storm events. Above these temperatures, detrimental effects typically occur to trout fisheries (NPS 2000e).

Because of ambiguously worded regulations regarding temperature requirements in trout streams, secondary standards for trout waters could result in the elevation of the temperature of the river in the park above the critical 23 degree Celsius level. This ambiguity is related to whether the standard is applied to the whole stream or to each individually permitted discharge.

The river within the park is a valuable and heavily- used natural resource within the Atlanta area. Fishing pressure has increased significantly over the past 20 years.

Trout feeding habits vary with location in the river. Very large trout occur immediately beneath Buford dam, as these fish feed heavily on threadfin shad and yellow perch that are released from the lake between December and April. High mortality of shad and perch in the lake due to cold winter temperatures produces a large food supply for these trout immediately beneath the dam (Scalley 2001). In areas farther downstream, trout feed on benthic macroinvertebrates during the same time of year. From June through August, trout in the river prefer to feed on terrestrial invertebrates. The shift to benthic invertebrates occurs in September.

Trout feeding habits in the park are not like those in a free- running river. In a naturally flowing river, sources of food, especially benthic invertebrates, largely originate from within the river. Lower water temperatures, high levels of turbidity and sediment depos-

its, shifting sand substrates, changing water levels, and changing water velocities make benthic invertebrates relatively unavailable as food for trout in the park for large parts of the year (NPS 2000e).

Physical Habitat Simulation (PHABISM) studies by Nestler et al. (NPS 2000e) concluded that the preferences of trout of all life stages for combinations of depth, velocity, and cover were all very similar within the park. In general, trout habitat below Buford Dam varies between optimum and near-optimum at lower flows (550- 1050 cubic feet per second) to a minimum value at higher discharges (approaching 10,000 cubic feet per second). Fish habitat is optimal much of the day for several hours under typical conditions (NPS 2000e).

The last published survey of benthic invertebrates in the mainstem of the park was conducted in 1971 by the Georgia Water Quality Control Board. This study assessed populations in five mainstem and four tributary (Suwanee, Crooked, Big and Sope Creeks) sites within the park using habitat sampling and basket sampling techniques (NPS 2000e). The study showed that some areas were nearly devoid of any benthic invertebrates. Comparison with areas on the river upstream of Lake Lanier and with data from the tributaries suggested that this was caused by the releases of “nutrient deficient cold water” from Lake Lanier (NPS 2000e). An ongoing study of benthic invertebrate populations and water quality sampling is being conducted (Scalley 2001).

Numerous older studies of benthic invertebrates in the tributaries of the park include studies by Environmental Protection Division (EPD 1966, 1973), the Georgia Water Control Board (NPS 2000e), and the Georgia Game and Fish Division (Hess et al. 1981). Several watershed assessments recently completed within the tributaries of the park include benthic invertebrate surveys, including a study of North Fulton County covering Johns Creek and Cauley Creek (Parsons 2001) and a study of Gwinnett County covering Crooked, Level, Richland and Suwanee Creeks (CH2M Hill 1998). These more recent studies show



that sedimentation and scouring from storm events have reduced the density and diversity of benthic populations in the majority of mainstream Piedmont streams sampled.

Many amphibians (frogs, salamanders) and reptiles (snakes, turtles) occur within the Chattahoochee River and its tributaries. Some species are locally very abundant in springs, seeps, and other terrestrial/water interfaces such as backwater pools, sloughs, and the mouths of tributary streams where they enter the mainstem of the river (NPS 2000e).

Two state- listed species of fish, the highscale shiner and the bluestripe shiner, occur in tributaries of the Chattahoochee River within the park (NPS 2000e). Recent surveys of a limited number of tributaries to the Chattahoochee River did not collect the bluestripe shiner (NPS 2000e). Other rare fish that have been collected from the park in the past include the grayfin redhorse and greater jumprock. No federally- listed species of aquatic organisms occur in the river. Two state- listed species of mussels, the sculptured pigtoe and the shinyrayed pocketbook, occur in the river mainstem (Georgia Natural Heritage Program 2001).

The Asian rice eel, an exotic non- native species, has been reported in the Chattahoochee River, apparently the result of an aquarium release (NPS 2000e). This presence of an eel-like fish was first noticed in 1991 in the ponds of the Chattahoochee River Nature Center.

Subsequent assessments in 1996 have concluded that the eel may have eliminated native sunfish populations in the ponds (NPS 2000e). The potential expansion of the range of this species is currently being assessed in a study by the University of Georgia, funded by the National Park Service. Another nuisance species that exists in the park includes the swamp eel, which is tolerant of low oxygen conditions. The red shiner, an opportunistic species native to areas west of the Mississippi River, also occurs in the park, first recorded in 1978 (NPS 2000e). It has become a dominant or co- dominant fish species in the river, and has replaced many of the native species in tributary streams of the park (NPS 2000e).

Various recent estimates of the biological integrity of tributaries within the park have been made using the Karr index of biological integrity (NPS 2000e). Biological integrity is defined as the “capacity to support and maintain a balanced, integrated, and adaptive biological system having the full range of elements (e.g., populations, species, assemblages) and processes (e.g., biotic interactions, energy dynamics, biogeochemical cycles) expected in a region’s natural habitat” (NPS 2000e). The index employs a set of 12 “metrics” to calculate a number that corresponds to a relative scale of water quality. The metrics represent differing sensitivities across a range of biotic integrity (NPS 2000e). Index scores for several streams within the park area are shown in Table 10.

Table 10: Index of Biological Integrity Scores for Tributary Streams in the Park

Site	Human Population per Square Kilometer	United States Geological Survey Gauge Number	Average Index of Biological Integrity	Note
Big Creek at Hwy 29	96	02335580	26 – Fair	Urbanizing
Suwanee Creek	151	02334865	28 – Fair	Urbanizing
Big Creek at Roswell	218	02335760	20 – Poor	Urbanizing



Table 10: Index of Biological Integrity Scores for Tributary Streams in the Park (Continued)

Site	Human Population per Square Kilometer	United States Geological Survey Gauge Number	Average Index of Biological Integrity	Note
Suwanee Creek at Woodward Mill Road	254	02334740	30 – Fair/Good	Urbanizing
Willeo Creek	605	02335790	22- 28 – Fair	Urban
Sope Creek	800	02335870	28- 30 – Fair	Urban
Rottenwood Creek	1,050	02335910	12 - 16 – Very Poor	Urban

40 indicates a perfect index score (cleanest); zero would indicate a totally disrupted ecosystem (NPS 2000c)
Source: NPS 2000e

Numerous other studies in which index of biological integrity scores have been measured within the park have been conducted as part of watershed assessments in Cobb, Gwinnett, Fulton and Forsyth Counties (e.g., Parsons 2001; NPS 2000e). In addition, the State of Georgia has developed a set of biological monitoring tools to evaluate and manage surface water quality (NPS 2000e). These tools include monitoring benthic macroinvertebrates and fish using the U.S. Environmental Protection Agency's Rapid Bio-assessment Protocol (Plafkin et al. 1989) and the Georgia Environmental Protection Division protocol (NPS 2000e).

Modifications of these protocols have been used to evaluate streams in the Atlanta area (Parsons 2001; CH2M Hill 1998). Cross comparison and evaluation of the results indicate that nonpoint runoff, sedimentation, and modification of current regimes and available benthic habitat in areas streams have combined to produce relatively low-diversity and low- quality populations of fish and benthic invertebrates compared to reference sites. Some assessments have also indicated potential impacts of specific discharges such as metals. Also, the differences in scores represent responses to different environmental stressors, as fish respond differently

from benthic invertebrates to the same stressor.

Wetlands and Floodplains

Wetlands and floodplains are included as an impact topic based on the criteria presented in "Impact Topics – Resources and Values at Stake in the Planning Process" in the "Alternatives" section. The specific concerns related to this impact topic are discussed in the "Environmental Consequences" section.

The Clean Water Act of 1977 and Executive Orders 11990 and 11988 identify wetlands and floodplains as national natural assets. These orders direct federal agencies to avoid the occupation, adverse modification, or degradation of wetlands and floodplains.

Approximately 152 acres comprising 39 different types of wetlands are found throughout the park (United States Fish and Wildlife Service 2001). National Wetland Inventory maps delineating these areas are available at the park headquarters. Table 11 provides a summary of the number of acres and relative percentages of each major wetland type that occur in the park.



Table 11: Summary of Acreages and Percentages of Each National Wetland Inventory Wetland Type That Occurs in the Park

National Wetland Inventory Type	Acres of Each National Wetland Inventory Type	Percent of Total Acres
Palustrine Forested	21.5	14.2 percent
Palustrine Scrub/Shrub	10.3	6.8 percent
Palustrine Unconsolidated Bottom or Shore	7.8	5.2 percent
Palustrine Emergent	6.2	4.1 percent
Lacustrine	33.4	22.0 percent
Riverine	72.7	47.9 percent
Total:	151.9	100.0 percent

Source: United States Fish and Wildlife Service 2001

Although not commonly perceived by the public as a “typical wetland,” riverine wetlands are included in the National Wetland Inventory system. As stated by the United States Fish and Wildlife Service, “The Riverine System includes all wetlands and deepwater habitats contained in natural or artificial channels periodically or continuously containing flowing water or which forms a connecting link between the two bodies of standing water. Upland islands or Palustrine wetlands may occur in the channel, but they are not part of the Riverine System” (U.S. Fish and Wildlife Service 2001). Riverine wetlands provide valuable aquatic habitats for fish and invertebrates and are a source of primary production (aquatic vascular plants). They account for 47.9 percent (72.7 acres) of National Wetland Inventory wetlands in the park.

Lacustrine wetlands (non- flowing open water areas partially occupied by wetland vegetation) make up 22 percent (33.4 acres) of the wetlands within the park. Lacustrine wetlands are defined as “wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30 percent areal coverage, and (3) total area exceeds 20 acres.” These areas include unconsolidated bottoms and areas populated by beds of rooted aquatic vegetation. Examples include the wetlands fringing the small pond in the Sope Creek area and the beaver pond in Cochran Shoals next to the running trail. These wetlands provide valuable wildlife habitat,

help control flooding, mitigate pollutants from nonpoint surface runoff, and have high rates of primary production.

Palustrine forested wetlands make up approximately 14.2 percent (21.5 acres) of the total acreage of wetlands in the park. These wetlands are dominated by mature hardwood trees that inhabit the floodplains of the Chattahoochee River, tributary streams, and associated sloughs. These areas experience variable degrees of flooding, but are flooded frequently enough to qualify as wetlands. Typical forested wetlands occur in floodplain areas at Bowmans Island, Island Ford, and Palisades. These wetlands provide important habitat for wildlife, protect the water quality of the river by stabilizing the stream and river banks, help control flooding, and produce plant material that helps support the adjacent aquatic ecosystem.

The remaining wetlands in the park include palustrine unconsolidated bottom or shore (5.2 percent; 7.8 acres), palustrine emergent (4.1 percent; 6.2 acres), and palustrine scrub/shrub (6.8 percent; 10.3 acres). Numerous emergent and scrub/shrub wetlands occur throughout the park, generally associated with beaver pond complexes. For example, an extensive wetland complex associated with a large beaver pond at the southern end of the Cochran Shoals area includes palustrine emergent, lacustrine, and scrub/shrub wetland on the floodplain next to the river. A series of elevated boardwalk trails provides visitors an opportunity to observe these wetlands. These habitats provide excellent



habitat for wildlife and are known to be excellent birding areas. In addition, they help control flooding, remove pollutants present in surface water runoff, recharge groundwater, and have high rates of primary production.

Wetlands serve a variety of important habitat, hydrologic, and water quality functions. They act as natural water purifiers, filtering sediment and absorbing pollutants in surface waters. Vegetation provides erosion control and helps prevent the downstream movement of sediment. Wetlands help maintain flow regimes and provide flood control by storing excess water during rain events, reducing downstream flood damage. They also provide unique habitat for many fish, wildlife, and plant species, including many threatened and endangered species. Wetlands in the park also offer recreational opportunities (NPS 1998c).

Wetlands in some areas of the park have been partially drained due to past practices. The hydrology in these areas could be restored by plugging ditches or making other hydrological modifications. This would improve the functions and values of these wetlands significantly. Wetlands in the park are provided the special protection and conservation inherent in the NPS mission. The National Park Service is required to play an active role in wetlands management, restoration, and public awareness (NPS 1998c).

One study concluded that the actual extent of wetlands in the park was probably larger than that depicted in the United States Fish and Wildlife Service National Wetland Inventory maps. In addition, some wetlands were not mapped by the National Wetland Inventory program. The study concluded that a detailed mapping of wetlands in the park should be conducted to provide a more accurate inventory (Garrow & Associates 1990).

Floodplains and associated wetlands play a critical role in maintaining riverine systems by providing flood and erosion control, maintaining water quality, and providing important wildlife habitat. Due to the basic geologic characteristics of the area, the floodplains along the Chattahoochee River and its tributaries are relatively narrow, reducing the margin of flood protection. The frequency and height of floodplain overflows have increased in the park

as a result of urbanization and associated increases in impervious surfaces in the watershed.

Despite these limitations, the Georgia RiverCare 2000 assessment assigned a “significant” rating to the floodplain of the Chattahoochee River within the park (Miller et al. 1998). This rating is largely based on the extent of wetlands within each floodplain and the implied ability of wetlands to control flooding and protect water quality. A floodplain area containing from 0.5 to 2 percent wetlands was assigned a “significant” rating. This rating applies only to the mainstem of the Chattahoochee River and does not take into account floodplain values of the numerous tributaries present within the park, which provide additional values.

The Federal Emergency Management Agency delineated floodplains in the park in 1998; the resulting maps are available at the park headquarters. The water resources management plan (NPS 2000e) provides maps of the individual park units, comparing the 100-year floodplain lines from this delineation to existing park unit boundaries. The Corps of Engineers has also prepared reports that provide maps and information for the 100-year floodplain in the park along the Chattahoochee River and Rottenwood Creek (1973, 1974).

Rare, Threatened, or Endangered Species

Rare, threatened, or endangered species are included as an impact topic based on the criteria presented in “Impact Topics – Resources and Values at Stake in the Planning Process” in the “Alternatives” section. The specific concerns related to this impact topic are discussed in the “Environmental Consequences” section.

The National Park Service is required under the Endangered Species Act to ensure that federally listed species and their habitats are protected on lands within the agency’s jurisdiction. In addition, park policy and management actions include maintaining state- and heritage program-listed species as part of the park’s natural heritage.

The Chattahoochee River Corridor, including the park, is a biologically significant resource that harbors a variety of protected and rare species of plants and animals (Wharton 1978; Miller et al. 1998). In general, the rich variety of plant and ani-



mal species in the park is caused by the overlapping of ranges of Coastal Plain and Appalachian species along a linear gradient within the Piedmont province. This, combined with the high degree of physical habitat diversity, including variable types of soils and rock formations, bluffs, slopes, and floodplains along the river, has led to the high overall species diversity present within the park.

As a result, the Georgia RiverCare 2000 River Assessment assigned the park an “outstanding” botanical rating for the Level Creek area and a “significant” rating for the portion of the park above Level Creek. An outstanding rating indicates an area has “at least one listed species or three special concern plants; at least one high quality natural community (intact and recoverable) with little disturbance, some logging, or some grazing; high diversity; and moderate richness” (Miller et al. 1998). A “significant” rating requires that a “segment contain at least one special- concern plant; at least one moderate- quality significant natural community (considerable disturbance, but intact and recoverable); only moderate diversity; and low to moderate richness” (Miller et al. 1998).

The U.S. Fish and Wildlife Service and the Natural Heritage Program of the Georgia Department of Natural Resources, Wildlife Resources Division were contacted to obtain information concerning the potential or actual occurrence of protected and rare species within the park and the surrounding area. The Georgia Department of Natural Resources identified 11 species of plants and animals known to exist within the park or within ½ mile of the park (see Table 12). Seven of the species are plants that are imperiled in the state because of rarity (S2). The remaining species include one plant and one mollusk that are critically impaired in the state because of extreme rarity (S1), one mollusk imperiled because of rarity (S2), and one mollusk rare or uncommon in the state (S3).

The Georgia Department of Natural Resources, Wildlife Resources Division also provided a much larger list of protected plants and animals that occur or could occur in the four- county region surrounding the park. Appendix F provides a list of these species, based on correspondence with the Georgia Department of Natural Resources, Wildlife Resources Division. Many or most of these species could occur in the park, although detailed,

site- specific surveys would be required to confirm their existence. These surveys would be conducted as part of site- specific environmental assessments conducted by the National Park Service in conjunction with proposed actions such as construction of roads, parking areas, trails, or buildings. These environmental assessments would be tiered to this general management plan and environmental impact statement as projects are developed by the National Park Service.

The U.S. Fish and Wildlife Service also provided lists of species that occur or could occur in the four- county area surrounding the park (Table 13; Appendix F;). As shown in Table 13, nine federally- listed animal species and seven federally- listed plant species were identified as actually or potentially occurring in the four- county area surrounding the park. This list includes federally- listed threatened and endangered species as well as those listed as Species of Management Concern by the U.S. Fish and Wildlife Service.

Terrestrial Ecological Resources

The park lies within the Piedmont physiographic province. The park harbors a wide variety of terrestrial habitat types, including old fields, ravines, floodplains, hills, and cliffs. The park is aligned along a northeast/southwest gradient where a variety of coastal plain and Appalachian species overlap within the Piedmont province. As a result, the park harbors over 850 species of vascular plants, representing one of the most diverse floras in the country (Heiman 2000). Some stands of vegetation are similar in composition to the original pre- Columbian vegetation (NPS 1989). These include, for example, “near- original” growths of very large oaks (bluff forest habitat) in steep areas within the Palisades area of the park. These areas were too steep and escaped logging in the early 1900s (Wharton 1978).

One of the primary natural features of the park is the interaction of the river with the associated floodplains and terrestrial habitats. These features combine to make a linear corridor of habitats arranged in a mosaic of natural beauty and high ecological value. Because many of the terrestrial habitats are relatively mature, second growth forests, they greatly augment the natural values of the park. The Palisades area includes unusual cliffs that were



Table 12: Georgia Natural Heritage Program Protected Species Known to Occur within the Park or within ½ Mile of the Park

Common Name	Scientific Name	Global Rank, State Rank, Federal Status, and State Status ¹	Preferred Habitat
Plants			
Alexander Rock Aster	<i>Aster avitus</i>	G3, S3, ---, ---	Granite outcrops in seepy margins with <i>Solidago gracillima</i> and <i>Spiranthes cernua</i>
American Ginseng	<i>Panax quinquefolius</i>	G3G4, S3, ---, ---	Mesic hardwood forests, cove hardwood forests
Bay Starvine	<i>Schizandra glabra</i>	G3, S2, —, T	Rich woods on stream terraces and lower slopes
Black- spored Quillwort	<i>Isoetes melanospora</i>	G1, L1, LE, E	Vernal pools on granite outcrops
Broadleaf Bunchflower	<i>Melanthium latifolium</i>	G5, S2?, —, —	Mesic deciduous hardwood forests
Crested Wood Fern	<i>Dryopteris cristata</i>	G5, SE1?, ---, ---	Swamps
Dwarf Pipewort	<i>Eriocaulon koernickianum</i>	G2, S1, ---, ---	Granite outcrops
Dwarf Sumac	<i>Rhus michauxii</i>	G2, S1, LE, E	Open forests over ultramafic rock
Flatrock Fimbry	<i>Fimbristylis brevivaginata</i>	G2, S3, ---, ---	Granite outcrops
Goldenseal	<i>Hydrastis canadensis</i>	G4, S2, —, E	Rich woods in circumneutral soil
Georgia Aster	<i>Aster georgianus</i>	G2G3, S2, C, —	Upland oak- hickory- pine forests and openings; sometimes with <i>Echinacea laevigata</i> (smooth purple cone-flower) or over amphibolite
Granite Stonecrop	<i>Sedum pusillum</i>	G3, S3, ---, T	Granite outcrops, often in mats of Hedwigia moss under <i>Juniperus virginiana</i>



Table 12 (cont.): Georgia Natural Heritage Program Protected Species Known to Occur within the Park or within ½ Mile of the Park

Common Name	Scientific Name	Global Rank, State Rank, Federal Status, and State Status ¹	Preferred Habitat
Plants (Cont.)			
Indian Olive	<i>Nestronia umbellula</i>	G4, S2, —, T	Mixed with dwarf shrubby heaths in oak- hickory- pine woods; often in transition areas between flatwoods and uplands
Harper Heartleaf	<i>Hexastylis shuttleworthii</i> var. <i>harperi</i>	G4T3, S2S3, ---, U	Lower terraces in floodplain forests, edges of bogs
Large- flowered Yellow Lady Slipper	<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	G5T5, S3, ---, U	Upland oak- hickory- pine forests, mixed hardwood forests
Log Fern	<i>Dryopteris celsa</i>	G4, S2, ---, ---	Floodplain forests, lower slopes of rocky woods
Louisiana Blue Star	<i>Amsonia ludoviciana</i>	G3, S2, ---, ---	Open woods near granite outcrops (limited to Lithonia Gneiss types)
Ohio Buckeye	<i>Aesculus glabra</i>	G5, S2, ---, ---	Mesic forests in circumneutral soil
Ozark Bunchflower	<i>Melanthium woodii</i>	G5, S2, —, R	Mesic hardwood forests over basic soils
Missouri Rockcress	<i>Arabis missouriensis</i>	G5, S2, ---, ---	Granite and amphibolite outcrops
Monkey- faced Orchid	<i>Platanthera integrilabia</i>	G2G3, StS2, C, T	Red maple- gum swamps, peaty seeps, and stream banks with <i>Parnassia asarifolia</i> and <i>Oxypolis rigidior</i>
Mountain Witch- alder	<i>Fothergilla major</i>	G3, S1, —, —	Rocky (sandstone, granite) woods; bouldery stream margins
Northern Prickly- ash	<i>Zanthoxylum americanum</i>	G5, Si?, ---, ---	Rocky, openly wooded slopes, river banks and terraces



Table 12 (cont.): Georgia Natural Heritage Program Protected Species Known to Occur within the Park or within ½ Mile of the Park

Common Name	Scientific Name	Global Rank, State Rank, Federal Status, and State Status ¹	Preferred Habitat
Plants (Cont.)			
Open- ground Whitlow-grass	<i>Draba aprica</i>	G3, S1S2, - - - , E	Granite and amphibolite outcrops, usually in red cedar litter
Piedmont Barren Straw- berry	<i>Waldsteinia lobata</i>	G2, S2, —, T	Stream terraces and adjacent gneiss outcrops; rocky, acidic woods along streams with mountain laurel (<i>Kalmia latifolia</i>); rarely in drier, upland oak- hickory- pine woods
Pink Ladyslipper	<i>Cypripedium acaule</i>	G5, S4, - - - , U	Upland oak- hickory- pine forests, piney woods
Pool Sprite	<i>Amphianthus pusillus</i>	G2, S2, LT, T	Vernal pools on granite outcrops
Schwerin Indigo- bush	<i>Amorpha schwerinii</i>	G3G4, S2, - - - , - - -	Rocky upland woods
Shining Indigo- bush	<i>Amorpha nitens</i>	G3?, S1?, - - - , - - -	Rocky, wooded slopes, alluvial woods
Silky Bindweed	<i>Calystegia catesbeiana</i> ssp. <i>sericata</i>	G2T3T2Q, S3S2, - - - , - - -	Openings in montane oak- pine forests
Southern Twayblade	<i>Listera australis</i>	G4, S2, - - - , - - -	Poorly drained circumneutral soils
Stone Mountain Mint	<i>Pycnanthemum cur- vipes</i>	G3, S2, - - - , - - -	Rocky, upland oak- hickory forests
Animals			
Amber Darter	<i>Percina antesella</i>	G1G2, S1, LE, E	Riffles and runs of medium- sized rivers
Bachman's Sparrow	<i>Aimophila aestivalis</i>	G3, S3, - - , R	Old fields, open pine or oak woods, and brushy areas
Bluestripe Shiner	<i>Cyprinella callitaenia</i>	G2G3, S2, - - , T	Flowing areas in large creeks and medium- sized rivers over rocky substrates
Bronze Darter	<i>Percina palmaris</i>	G4, S2, - - - , - - -	Moderate to swift riffles over rocky substrates in streams and rivers



Table 12 (cont.): Georgia Natural Heritage Program Protected Species Known to Occur within the Park or within ½ Mile of the Park

Common Name	Scientific Name	Global Rank, State Rank, Federal Status, and State Status ¹	Preferred Habitat
Brother Spike (Mussel)	<i>Elliptio fraterna</i>	G1, S1, —, —	Sandy substrates of river channels with swift current
Bullhead Minnow	<i>Pimephale savigilax</i>	G5, S3, - - -, - - -	Sluggish medium to large rivers over silty sand substrates
Cherokee Darter	<i>Etheostoma scotti</i>	G2, S2, LT, T	Small to medium creeks with moderate current and rocky substrates
Animals (Cont.)			
Delicate Spike	<i>Elliptio arcata</i>	G3G4, S3, - - -, - - -	Large rivers and creeks with some current in sand and sand and limestone rock substrates
Four- toed Salamander	<i>Hemidactylium scutatum</i>	G5, S3, - - -, - - -	Swamps, boggy streams and ponds, wet woods
Gulf Moccasinshell	<i>Medionidus penicillatus</i>	G1, S2, LE, E	Sandy/rocky medium- sized rivers and creeks
Highscale Shiner	<i>Notropis hypsilepis</i>	G3, S3, - - , T	Flowing areas of large to small streams over sand or bedrock substrates
Northern Pine Snake	<i>Pituophis melanoleucus melanoleucus</i>	G4T4, S2, - - -, - - -	Dry pine or pine- hardwood forests
Peregrine Falcon	<i>Falco peregrinus</i>	G4, S1, PS:LE, E	Rocky cliffs and ledges, seacoasts
Shiny- rayed Pocketbook (Mussel)	<i>Lampsillis subangulata</i>	G2, S2, LE, E	Sandy/rocky medium- sized rivers & creeks
Silverstripe Shiner	<i>Notropis stilbius</i>	G4, S3, - - -, - - -	Medium- sized streams and rivers in flowing pools over sandy to rocky substrates
Southern Brook Lamprey	<i>Ichthyomyzon gagei</i>	G5, S3, - - -, - - -	Creeks to small rivers with sand or sand and gravel substrates
Sculptured Pigtoe (Mussel)	<i>Quincuncina infucata</i>	G4, S3, - - -, - - -	Main channels of rivers and large streams with moderate current in sand and limestone rock substrates



Table 12 (cont.): Georgia Natural Heritage Program Protected Species Known to Occur within the Park or within ½ Mile of the Park

Common Name	Scientific Name	Global Rank, State Rank, Federal Status, and State Status ¹	Preferred Habitat
Animals (Cont.)			
Webster's Salamander	<i>Plethodon websteri</i>	G3, S1, - - - , - - -	Moist forests near rocky streams
Source: Georgia Natural Heritage Program, Georgia Department of Natural Resources, Wildlife Protection Division 2001			
¹ Listed in order left to right by state global rank, state rank, federal status, and state status. Line (- - -) indicates no status has been assigned to that species. The following is an explanation of these rankings:			
STATE [GLOBAL] RANK			
S1[G1]	Critically imperiled in state [globally] because of extreme rarity (5 or fewer occurrences).		
S2[G2]	Imperiled in state [globally] because of rarity (6 to 20 occurrences).		
S3[G3]	Rare or uncommon in state [rare and local throughout range or in a special habitat or narrowly endemic] (on the order of 21 to 100 occurrences).		
S4[G4]	Apparently secure in state [globally] (of no immediate conservation concern).		
S5[G5]	Demonstrably secure in state [globally].		
?	Denotes questionable rank; best guess given whenever possible (e.g. S3?).		
FEDERAL STATUS (U.S. Fish and Wildlife Service)			
LE	Listed as endangered. The most critically imperiled species. A species that may become extinct or disappear from a significant part of its range if not immediately protected.		
STATE STATUS			
E	Listed as endangered. A species that is in danger of extinction throughout all or part of its range		
T	Listed as threatened. A species that is likely to become an endangered species in the foreseeable future throughout all or parts of its range.		
R	Listed as rare. A species that may not be endangered or threatened but that should be protected because of its scarcity.		



Table 13: United States Fish and Wildlife Service Protected Species Known to Occur in the Four- County Area Surrounding the Park or within the Park

Common Name	Scientific Name	Federal Status	Habitats
Animals			
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T	Inland waterways and estuarine areas in Georgia
Red Cockaded Woodpecker	<i>Picoides borealis</i>	E	Nest in mature pine with low understory vegetation (<1.5meters); forage in pine and pine hardwood stands ≥ 30 years of age, preferable > 10 inch diameter at breast height
Cherokee Darter	<i>Etheostoma scotti</i>	T	Shallow water (0.1- 0.5 meters) in small to medium warm water creeks (1- 15 meters wide) with predominantly rocky bottoms; usually in sections with reduced current, typically runs above and below riffles and at ecotones of riffles and backwaters
Gulf Moccasinshell Mussel	<i>Medionidus penicillatus</i>	E	Medium to large rivers with slight or moderate current over sand and gravel substrates; may be associated with muddy and sand substrates around tree roots
Gray Bat	<i>Myotis grisescens</i>	E	Colonies restricted to caves or cave- like habitats; forage primarily over water along rivers or lake shores
Bachman's Sparrow	<i>Aimophila aestivalis</i>	SOMC	Abandoned fields with scattered shrubs, pines or oaks
Bluestripe Shiner	<i>Cyprinella callitaenia</i>	SOMC	Brownwater streams
Northern Pine Snake	<i>Pituophis m. melanoleucus</i>	SOMC	-
Appalachian Bewick's Wren	<i>Thyromanes bewickii altus</i>	SOMC	Dense undergrowth, overgrown fields, thickets and brush in open or semi- open habitat; feed primarily on insects
Plants			
Michaux's Sumac	<i>Rhus michauxii</i>	E	Sandy or rocky open woods, usually on ridges with a disturbance history (periodic fire, prior agricultural use, maintained right- of- ways); the known population of this species in Cobb County has been extirpated(last seen in county in 1900)
Monkey- face	<i>Platanthera integrilabia</i>	SOMC	Red maple- blackgum swamps; also on sandy damp stream margins; or on seepy, rocky, thinly vegetated slopes



Table 13 (Cont.): United States Fish and Wildlife Service Protected Species Known to Occur in the Four- County Area Surrounding the Park or within the Park

Common Name	Scientific Name	Federal Status	Habitats
Little Amphianthus	<i>Amphianthus pusillus</i>	T	Shallow pools on granite outcrops, where water collects after a rain. Pools are less than one foot deep and rock rimmed
Black- Spored Quillwort	<i>Isoetes melanospora</i>	E	Shallow pools on granite outcrops, where water collects after a rain; Pools are less than one foot deep and rock rimmed
Flatrock Onion	<i>Allium speculae</i>	SOMC	Seepy edges of vegetation mats on outcrops of granitic rock
Alexander Rock Aster	<i>Aster avitus</i>	SOMC	
Small- headed Pipewort	<i>Eriocaulon kornickianum</i>	SOMC	Granite outcrops and upland- sandhill- acid seeps
Source: U.S. Fish and Wildlife Service 2001			
FEDERAL STATUS			
E	Listed as endangered. The most critically imperiled species. A species that may become extinct or disappear from a significant part of its range if not immediately protected.		
T	Listed as threatened. Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.		
SOMC	Federal species of management concern.		



the basis of the original designation of the park as a nationally significant resource. The cliffs of the Palisades and associated bluffs are populated by near- original hardwood forests, a unique natural resource. Other areas of the park also support near- original plant communities that are unique resources as well.

The present landscape and vegetation in the park is a mixture of old fields, natural stands of second growth trees, some near- original stands of forest, and planted trees. The present forest is defined as a “modified second growth deciduous hardwood and hardwood- pine mixtures” (Wharton 1978). Residential development and other sources have introduced several exotic species, including privet, English Ivy, kudzu, Japanese honeysuckle, mimosa, princess tree, and periwinkle. Chestnut blight and pine beetle have affected native trees (NPS 2000e). Despite these issues, the Georgia RiverCare 2000 Assessment assigned a rating of outstanding for forest resources within the park (Miller et al. 1998). A rating of significant was assigned for river segments with 50 to 75 percent forested cover. This was the only standard used to rate forest resources.

The park provides habitat for a wide variety of wildlife, including birds, mammals, reptiles, and amphibians. The oak- hickory climax forest is the most widespread terrestrial habitat type in the park, but it is characterized by a lower overall diversity of species; wildlife diversity is greater in the mesic bluff and bottomland habitats (Wharton 1998). These habitats are present in the park, but are less common.

Common species of mammals in the park include deer, raccoons, opossums, squirrels, eastern cottontail rabbits, short- tailed shrew, pine vole, deer mouse, and chipmunk. Numerous species of reptiles and birds are also present (NPS 1989; Wharton 1998). Common birds in the oak- hickory climax forest include red- eyed vireo, towhee, Carolina wren, brown thrasher, cardinal, blue jay, wood thrush, tufted titmouse, chickadee, red- breasted woodpecker, downy woodpecker, pileated woodpecker, crow, and red- tailed hawk (Wharton 1998). Wharton noted that only a single species of salamander (the slimy salamander) occurs in the oak- hickory climax forest (1998). This habitat also supports toads and box turtles, and rarely, frogs, numerous species of snakes, and one species of

lizard (little brown skink).

The RiverCare 2000 river assessment recently published by the Georgia Department of Natural Resources (Miller et. al. 1998) assigned ratings of significant, outstanding, or superior to portions of rivers in the state that met a set of criteria established by Georgia Department of Natural Resources. The rating criteria included diversity of species and native habitats, habitat value for species of concern as listed in the Georgia Heritage Program database, the percentage of river that was naturally vegetated, and the degree of habitat fragmentation. Because habitats in the park are highly fragmented and dominated by relatively lower diversity oak- hickory climax forests, the Chattahoochee River between Atlanta and Lake Lanier, including the park, did not qualify for a rating.

The park is important to wildlife in part because it connects the Piedmont and Mountain physiographic provinces. As such, the park serves as a migratory route and a means of range extension for many forms of wildlife. For example, some species more common in mountainous area have moved south along the river corridor and into the park (NPS 1989, Wharton 1998). The park provides an area of naturally vegetated habitat, including upland forests, riparian areas, wetlands, and aquatic habitats.

As the population of Atlanta continues to grow, the park will become increasingly important as a refuge for native wildlife in the area and along the river corridor. Since the park has been expanded to 10,000 acres, it will serve an increasingly important role as habitat for wildlife in the future, as these areas will be protected and managed by the National Park Service.

Prime and Unique Farmlands

Prime and unique farmlands are included as an impact topic based on the criteria presented in “Impact Topics – Resources and Values at Stake in the Planning Process” in the “Alternatives” section. The specific concerns related to this impact topic are discussed in the “Environmental Consequences” section.

The U.S. Department of Agriculture's Soil Conservation Service has prepared soil surveys for the counties surrounding the park: Cobb County (1973, with a 1996 update); Forsyth County (1960); Fulton County (1958, with a 1982 supplement); and Gwinnett County (1967). Upland soils in the park belong principally to the Madison- Louisa- Pacolet association and the Wickham- Altavista- Red Bay association. These soils are located on steep slopes and are highly erodable, shallow, and rocky. Bottomland soils in the park belong primarily to the Congaree- Chewacla- Wehadkee association and the Cartecay- Toccoa association, and are located on nearly level areas along the Chattahoochee River and some of its tributaries. These soils are often highly erodable, and uncontrolled exposure of such soils has resulted in accelerated erosion and attendant sediment and siltation in the Chattahoochee River (NPS 1989; NPS 2000e).

In addition to basic soil physical information and engineering aspects, the soil surveys provide necessary information and data for park management on:

Erodability: Factors for use in the universal soil loss equation for predicting yields of suspended sediment from land surfaces. For example, the surveys discuss erosion potential associated with construction activities on particular soils.

Recreation: Specific soils' potentials for camp, picnic, playground, or trail use (i.e., trafficability, ability to drain).

Wildlife: Soils' potential for maintaining wildlife habitat and vegetation of various types.

An August 11, 1980, memorandum from the Council on Environmental Quality directed that federal agencies must assess the effects of their actions on farmland soils classified by the Natural Resource Conservation Service as prime or unique. Prime farmland soil has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oil seed crops and is available for these uses (i.e., it is not urban or developed land nor is it under water). Unique farmland soil is used for the production of high-value food crops, such as fruits, vegetables, and nuts. Prime and unique farmlands have the combination of soil

properties, growing season, and moisture supply needed to produce sustained high yields of crops.

A number of the soil types in the northern section of the park (north of Holcomb Bridge Road) have been classified as prime farmlands. A map of these prime farmlands is on file at the park headquarters. Site-specific assessments of the impacts of proposed NPS projects on prime and unique farmland, using Natural Resource Conservation Service methods, will be required in the future. This involves assigning an impact score to the project to estimate the degree of impact on prime and unique farmlands. These assessments will be conducted as part of environmental assessments tied to this general management plan and environmental impact statement.

CULTURAL RESOURCES

Cultural resources are included as an impact topic based on the criteria presented in "Impact Topics – Resources and Values at Stake in the Planning Process" in the "Alternatives" section. The specific concerns related to this impact topic are discussed in the "Environmental Consequences" section. Baseline data for cultural resources issues were obtained from the Georgia State Historic Preservation Officer in Atlanta, the Georgia State Site Files at the University of Georgia, Athens, and the files of Mr. David Ek, Chief of Science and Resource Management at the park. Data collection occurred between October 2000 and March 2001. Approximately 30 percent of the park (revised boundaries) has been subjected to archeological survey as of March 2001. As described in the "Servicewide Mandates and Policies" section, an archeological inventory of the park is required by law. In addition, individual surveys are needed prior to the initiation of ground-disturbing activities. Areas identified as having a high potential for archeological resources must be treated with special sensitivity.

The park appears to have been occupied for at least 10,000 years. The earliest known occupation of the park dates to the Early Archaic Period, between 8000 and 6000 BC. The cultural chronology of the region prior to the arrival of Europeans is divided into several periods: Paleoindian (9500 to 8000 BC), Archaic (8000 to 1000 BC), Woodland (1000 BC to 1000 AD), and Mississippian and Late Pre-



historic (1000 AD to European contact). The Paleoindian, Archaic, Woodland and Mississippian Periods are each further divided into early, middle and late periods. Broadly speaking, the Paleoindian Period refers to the occupation of the first people to arrive in North America during the last Ice Age, and is characterized by distinctive projectile points used in part for hunting the large mammals, or megafauna, that roamed the continent prior to the end of the Pleistocene. The Archaic Period refers to an era of gathering and hunting following the end of the last Ice Age. The presence of ground- stone tools witnesses to increased food processing habits. The Woodland Period saw increased sedentism, especially in riverine environments, and the introduction of ceramic vessels. The Mississippian Period is characterized by complex societies and sites with elaborate earthworks.

O'Grady and Poe (1980) concluded that the park was most extensively occupied during the Woodland Period. This was based on an extensive archaeological survey they conducted identifying 70 sites. Numerous surveys have been conducted on or near the park since that time, identifying sites dating from the Archaic through Late Mississippian Periods (Gresham 1987, Moore 1986, Hamby and Reed 1995, Webb and Gantt 1995, Markham and Holland 1996, Webb and Burns 1997, Webb et al. 1998, Gantt and Tilley 1999, Gantt and DeRosa 2000, and Webb and Quirk 2000). Woodland sites remain the most numerous of those prehistoric sites that can be assigned a temporal affiliation.

Prior to nineteenth century manipulation of the Chattahoochee River for industrial purposes, the river corridor was a fertile region dedicated to agricultural production (Brown 1980). Early European settlers in the region brought with them agricultural tools and a variety of crops that broadened the agricultural base of both European and Native American populations. With increased interaction with whites, native tribes adopted lifestyles similar to those of the white settlers. Farming, along with mixed livestock raising, became the primary activity in the river corridor (Brown 1980).

The Chattahoochee River became a battleground during the Battle of Atlanta in 1864 after Confederate defenses were turned at Kennesaw Mountain and Cheatam's Hill in June. Confederate lines reformed northwest of the river from Smyrna to

Nickajack Creek. The Union attacked this line on July 4. The Confederate Army was forced back towards the Chattahoochee River, and retreated across it to stage the last defense of Atlanta by July 17. Atlanta fell to the Union Army on September 2, 1864. Known Civil War features in the park include picket depressions and trenches. Examples include log and earthwork forts associated with the Johnston's River Line, where confederate troops were forced to retreat from Sherman; and Sherman's River Crossings, which Sherman used to flank Johnston's Line (Brown and Smith 1994).

Agriculture remained a steady occupation of white settlers in the river corridor throughout the nineteenth century, reaching its peak between 1910 and 1920, when 87 percent of the piedmont had been cultivated (Brown 1980). The shift from mixed farming to intensive cotton cultivation in the 1850s and the long- term failure to implement soil conservation practices began to take their toll. Contributing to the rapid decline of fertility in the region was the practice of hydraulic mining of gold in the headwaters of the Chattahoochee, which resulted in extensive deforestation of the upper river corridor (Brown 1980). By 1935, most of the rich topsoil in the Chattahoochee River floodplain was eroded and deposited in stream bottoms.

The decline in soil fertility forced small farmers to change occupations, and many Southern rural families migrated to the North after Reconstruction in search of jobs in the cities. Others adopted an entrepreneurial approach and turned their attention to developing the industrial potential of the Chattahoochee River. Mills and distilleries had been present along the river corridor since the 1830s but, for a number of reasons (including destruction of many mills during the Civil War), industry did not become the major enterprise in the region until agriculture became unviable. In the 1930s, mill villages replaced farmsteads, and rapid growth of commerce and industry along the Chattahoochee River began to alter the river landscape.

By the turn of the twentieth century, however, industrialists were discovering the increased efficiency and output of steam- generated and electrical power for manufacturing. Expansion of the railroads in the latter half of the nineteenth century also had given the region greater access to national markets, reducing the reliance on locally manufac-

tured goods. The importance of the Chattahoochee River for industrial manufacturing was thus diminished, and other uses – drinking water supply and hydroelectric power generation – gained importance (Brown 1980).

Historically accustomed to relying on public or private wells for drinking water, in the face of rapid expansion of urban area and population, the people of Atlanta found themselves without a reliable source of drinking water. Construction of the pumping station at the junction of Peachtree Creek and the Chattahoochee River in 1892, as part of what would later become the Atlanta Water Works, temporarily solved the problem of water by pumping water directly from the river.

Morgan Falls Dam, constructed in 1902, was the largest hydroelectric installation in the Southeast, measuring 900 feet in length by 60 feet in height. In the 1920s, improvements to Morgan Falls Dam resulted in the creation of large reservoirs along the Chattahoochee River corridor and provided a storage area for water pumped from the river during periods of high water.

In 1957, the U.S. Army Corps of Engineers erected the Buford Dam with the goals of providing flood control and stream flow regulation, assisting in navigation, providing a constant source of water, and producing electrical power. Located on the Chattahoochee River about 35 miles northeast of Atlanta, Buford Dam collects runoff water from a wide area of north Georgia into a large reservoir, Lake Sidney Lanier. Lake Lanier extends 44 miles up the Chattahoochee River and covers more than 58,000 acres of former farmland and forests.

On August 15, 1978, the United States Congress passed an act authorizing the establishment of the Chattahoochee River National Recreation Area (16 United States Code 460ii). The boundaries of the park were subsequently modified in Amendments to the Chattahoochee River National Recreation Area Act in September 1984 and August 1998. Most recently, in June 1999, Congress enacted a bill to improve protection and management of the park.

Archeological Resources

Several studies provide significant data concerning the park's archeological resources as well as the

status of archeological research and previous archeological work in the park. These studies include:

An Archaeological Reconnaissance of the Chattahoochee River Corridor between Buford Dam and Georgia 20 Highway Bridge (Hamilton 1974).

Cultural Resource Inventory Chattahoochee River National Recreation Area Final Report (O'Grady and Poe 1980).

Cultural Resources Survey of the Proposed Lake Sidney Lanier Reregulation Dam and Lake Area, Forsyth and Gwinnett Counties, Georgia (Gresham 1987).

Phase I Cultural Resource Survey of 286 acres west of the Chattahoochee River in Forsyth County, Georgia (Markham and Holland 1996).

Cultural Resources Survey, Proposed Trail System, Chattahoochee River National Recreation Area, Forsyth County, Georgia (Webb and Burns 1997).

Cultural Resources Survey, Proposed New Trail System, Island Ford Unit, Chattahoochee River National Recreation Area, Fulton County, Georgia. (Gantt and DeRosa 2000).

Additional surveys completed within the boundaries of the park include: Magennis and Williams (1978), Bowen (1981), Braley (1987), Rogers and Braley (1991), Ledbetter et al. (1991), Braley et al. (1992), Gardner and Reynolds (1993), Webb and Gantt (1995, 1996a, 1996b), Webb and Duncan (1997), Gantt (1997), and Webb et al. (1998). Copies of these reports, as well as relevant maps and archival materials regarding specific resources within the park, are stored at park headquarters in Fulton County, Georgia.

Review of the site files maintained by the University of Georgia, Athens, conducted in the fall of 2000 indicated that 189 archeological sites have been previously recorded within the boundaries of the park. Of these, 32 lie within Cobb County, 46 in Forsyth County, 26 in Fulton County, and 85 in Gwinnett County. Artifact scatters dominate the sites recorded within the park and include ceramic scatters, lithic scatters, historic artifact scatters, and scatters encountered in association with rock shel-



ters, historic structures, open habitations, or villages. Fourteen of the sites include rock shelters, two are quarries, five are fish weirs/rock dams located within the river, one contains a probable mound, and one includes earthworks. Native American habitation sites include open habitations, camps, and villages in addition to the rock shelters. Historic sites with structural components include a bridge, three mills (one with a race), a cotton gin, a dam, a fence, a still, and nine structural foundations.

Locational data provided in earlier survey reports do not always match the locational data archived within the GIS database maintained by the Georgia State Site Files at the University of Georgia, Athens. Rectification of the survey data sets with those maintained by the Georgia State Site Files will be included as a task to be completed as part of the cultural resources management plan for the park.

Three of the sites are currently submerged and 13 have been destroyed; the majority of the remaining sites have been extensively (57), moderately (44), or minimally (36) disturbed by erosion, agriculture, vandalism, or development. The condition of 36 of the sites is not recorded in the site files.

There is a high probability that unknown prehistoric and historic archeological resources occur in the park. However, the archeological sites in the park have not been systematically surveyed or inventoried, and precise information about the location, characteristics, and significance of the majority of known archeological resources in the park is incomplete.

NPS policy at the park is to work with the Georgia State Historic Preservation Officer to nominate all archeological resources within the park that appear to meet the National Register of Historic Places criteria. A review of the National Register and the site files maintained by the University of Georgia, Athens, indicates that two archeological sites recorded within the park have been determined eligible for listing on the National Register of Historic Places, 13 have been recommended eligible for listing, and 67 have been recommended not eligible for listing. One site is a national natural landmark, and two have been subjected to Historic American Engineering Record documentation. The 104 remaining sites within the boundaries of the park

have not been evaluated in terms of their eligibility for listing on the National Register of Historic Places.

Historic Resources

To date, only one NPS documentary study has been commissioned regarding the historical development of the park: *Historic Resource Study: Chattahoochee River National Recreation Area and the Chattahoochee River Corridor* (Brown 1980).

Other resources that provide information regarding the historical development of Atlanta and north-central Georgia include:

“Outline of Prehistory and History in the Southeastern U.S. and Caribbean Culture Area” (National Park Service www.cr.nps.gov/seac/outline.htm); and “Georgia Before Oglethorpe: A Resource Guide to Georgia's Early Colonial Period 1521- 1733” (Worth, <http://hometown.aol.com/jeworth/gboinde x.htm>).

Historical National Register Properties. A review of the historic structures and buildings files maintained by the Georgia State Historic Preservation Officer in Atlanta indicates that 14 historic structures or buildings have been recorded within the boundaries of the park. Seven of the 14 resources are considered eligible for listing on the National Register of Historic Places, two are considered potentially eligible, one is considered not eligible, and four have not been evaluated.

In addition to the 14 resources recorded by the county surveys, the National Park Service has identified 10 additional buildings, complexes, or structures associated with the park and placed them on the “List of Classified Structures” for the park. Settles Bridge (00180) occurs on both the State Historic Preservation Officer and NPS lists (both as a historic structure and an archeological site), while the ruins of Ivy Mill and the Soper Creek/Marietta Paper Mill are recorded as archeological sites by the State Historic Preservation Officer. The Ivy Mill ruins (00169-00171) and the Allenbrook House (00179) have been recommended eligible for listing on the National Register of Historic Places,

and the Sope Creek/Marietta Paper Mill ruins (00165- 00168) were listed on the National Register of Historic Places in 1973. The Yardum House and Smokehouse (91688- 91689), and the Island Ford Lodge Complex (00166- 01168) have been recommended as eligible for listing on the National Register of Historic Places; however, these recommendations have not been confirmed by the State Historic Preservation Officer. There is the potential for undiscovered archaeological features associated with these properties. The Akers Mill ruins (00177), the Scribner Cemetery (00178), and Settles Bridge (00180) have not been evaluated.

The Allenbrook House, located south of the Roswell Historic District (also listed in 1973), is not within the boundaries of the district, but is considered potentially eligible for listing in the National Register of Historic Places. Under the terms of a Memorandum of Understanding, the National Park Service and the Roswell Historical Society share responsibility for preservation and maintenance of this resource.

The Powers Cabin and Hyde Farm complex lie on 2.5 acres within a larger tract that was transferred to the National Park Service by the Trust for Public Land in 1996, and a Historic Structure Report was completed on the complex. A "Deed of Conservation and Facade Easement" dated January 11, 1999, notes that the National Park Service has granted life- long tenancy to Ms. Morning Washburn, after which the land and resources will revert to NPS ownership. Materials supporting a nomination of the complex to the National Register of Historic Places have been submitted to the State Historic Preservation Officer; a formal nomination has not been completed.

REGIONAL TRANSPORTATION CONDITIONS

The park is located in one of the nation's largest urban areas, providing a natural refuge from urban life near the homes of millions of urbanites. The park is made up of 16 different areas, with access provided by a numerous streets and roadways; col-

lector and local roadway facilities provide direct access to most areas.

The Atlanta region is the major transportation hub of the southeastern United States. Along with the busiest airport in the United States, as the Regional Map shows, Atlanta is served by a number of interstate highways that connect the Atlanta area to other parts of the United States. Interstate 285 encircles Atlanta, providing a bypass route around the congested downtown area. In addition, Georgia 400, which bisects the Chattahoochee watershed and the park, is a strategically located highway between the City of Atlanta and the northern suburbs (see Vicinity Map). An ongoing study of the highway corridor could result in regional impacts to the park units.

The transportation network in the Atlanta Regional Commission's 10- county Atlanta region consists of more than 16,000 miles of streets and highways. The interstate highway system contains approximately 90 miles of express lanes to assist commuters in traveling to downtown Atlanta during the peak traffic periods. However, Atlanta, like other large metropolitan areas, contains many roads that operate at low service levels due to inadequate capacity. It is estimated that 29 percent of the total vehicle miles traveled during a typical weekday in the Atlanta region occurs on highly congested roadway facilities (Atlanta Regional Commission 2000b). Similar information was not available for Forsyth County.

The Metropolitan Atlanta Regional Transportation Authority (MARTA), the mass transit provider for the Atlanta area, serves Fulton and DeKalb Counties in the study area. MARTA has 46 miles of rail facilities and 230 rail cars in its system. In addition, 860 buses provide service on numerous routes totaling nearly 2,700 route- miles. In 2000, 7.2 percent of the work trips in the Atlanta region were made by mass transit (Atlanta Regional Commission 2000b). MARTA does not currently provide specific services or routes associated with the park.

Cobb Community Transit provides bus service within Cobb County, with connections to MARTA rail stations and direct express service to downtown Atlanta (Cobb Community Transit 2000). Gwinnett County Transit began operations in November 2001 with six I- 85 express bus routes from



points in Gwinnett County to downtown Atlanta, including stops at MARTA rail stations. Local service to points within Gwinnett County is planned for the future (Gwinnett County Transit 2001). Forsyth County currently has no scheduled route bus system, but does operate a demand responsive “Dial- A- Ride” transit system.

As described in the “Visitor and Community Values” subsection, the Atlanta region is growing very rapidly, leading to increased travel demand in the area. An estimated 47 percent of the vehicle miles traveled during a typical weekday in the year 2025 will occur on highly congested roadway facilities if no improvements are made to the roadway system. While mass transit use for daily commuting would increase to 9.7 percent in 2025 if the improvements recommended in the Atlanta Regional Transportation Plan are constructed, without such improve-

ments, use would drop to 5.5 percent, nearly 2 percent lower than current levels (Atlanta Regional Commission 2000a).

TRANSPORTATION CONDITIONS IN RELATION TO THE PARK

The park is comprised of segmented parcels of land located along a 48- mile corridor of the Chattahoochee River. No single roadway provides access to all of the segments. In addition, most areas of the park are located on minor collector or local roadways; therefore, arterial roadways do not provide primary access to the park. Table 14 lists the most common path to each area from the nearest freeway or arterial highway. Those that are congested during the morning and evening peak travel periods are indicated in italics.

Table 14: Main Street/Highway Access Points for the Park and Associated Areas

Area	Street / Highway Access*
Paces Mill	<i>I- 285, I- 75, Cobb Parkway</i>
Palisades	<i>I- 285, Northside Drive, Mt. Vernon Highway, Powers Ferry Road, Riverview Road</i>
Cochran Shoals	<i>Johnson Ferry Road, Paper Mill Road, Columns Drive</i>
Powers Island	<i>I- 285, Northside Drive</i>
Johnson Ferry	<i>Johnson Ferry Road</i>
Gold Branch	<i>Lower Roswell Road, Timber Ridge Road</i>
Vickery Creek	<i>Roswell Road, Azalea Drive, Riverside Road</i>
Island Ford	<i>Georgia 400, Northridge Road, Dunwoody Place, Roberts Drive</i>
Holcomb Bridge	<i>Holcomb Bridge Road</i>
Jones Bridge	<i>Holcomb Bridge Road, Jones Bridge Road, Barnwell Road</i>
Medlock Bridge	<i>Peachtree Parkway, Medlock Bridge Road</i>
Abbotts Bridge	<i>Abbotts Bridge Road, Boles Road</i>
Suwanee Creek	<i>Peachtree Industrial Boulevard, Chattahoochee Drive (unpaved)</i>
McGinnis Ferry	<i>McGinnis Ferry Road</i>
Settles Bridge	<i>Suwanee Dam Road, Johnson Road (unpaved)</i>
Bowman’s Island	<i>Cumming Highway/Georgia 20, Suwanee Dam Road</i>

*Italics indicate congested roadways

Transit service is provided in areas near the park, but service is currently not provided directly to the park. MARTA route 148 provides service between the Sandy Springs rail station and the Powers Ferry Landing area, near the Powers Island portion of the park. MARTA route 140 crosses the Chattahoochee River on Georgia 400 as it travels between the Mansell Road park- and- ride lot and the North Springs rail station. MARTA's North Line provides rail service in the general vicinity of the park, with rail stations at the Medical Center near Georgia 400/I- 285, Dunwoody, Sandy Springs, and North Springs. Bicycles can be transported on the MARTA rail system and are allowed on MARTA buses (MARTA 2001).

Cobb Community Transit connects with the MARTA system in the study area at Dunwoody rail station via route 60, which crosses the river on Johnson Ferry Road. Route 10B provides service along Powers Ferry Road between the MARTA Five Points station and areas close to several of the southernmost areas of the park. Several other routes provide service to points near the park, but none provide direct transit service to the park. These include 15, providing service between Marietta Square and the Powers Ferry Road area, and route 50 between the Marietta Transfer Center and the Powers Ferry Road area (Cobb Community Transit 2000).

A few bicycle/pedestrian paths currently exist near the park. Paths are located along Columns Drive from Sope Creek to Johnson Ferry Road, along Riverside Road near Island Ford, along Georgia 141 to the south of Medlock Bridge Road, along Peachtree Industrial Boulevard between Suwanee Creek and McGinnis Ferry Road, and along Buford Dam Road east of Bowmans Island. None of these bicycle/pedestrian paths provides direct access into the park (Atlanta Regional Commission 2001b; Forsyth County 1996, 2001; City of Roswell n.d.).

Additional bicycle/pedestrian path projects have been proposed by local governments in the Atlanta region. These have been compiled in the Atlanta Regional Commission's *Atlanta Region Bicycle Transportation and Pedestrian Walkways Plan* (1995), currently being updated. The National Park Service is also developing an integrated trail system plan with objectives to establish trail linkages.

PARK TRANSPORTATION CONDITIONS

The 1998 visitors survey (NPS 1998a) reported that 91 percent of park visitors are from Georgia, and 88 percent of the visitors had previously visited the park. Approximately 56 percent of respondents had visited the park at least 10 times in the past year, and 22 percent had visited the park at least 51 times during that period.

Each area comprising the park provides different visitor experiences. Areas located in the southern portion of the park are near a larger population base than the northern areas. Consequently, levels of visitation to different areas of the park vary considerably. According to traffic counts collected by the National Park Service in 2000 (NPS 2000a), vehicles entering each area with formal parking facilities range from 12,500 annually at Gold Branch to 415,000 at Cochran Shoals North. In areas where traffic was counted, nearly 1.5 million vehicles entered the park during 2000, with many of the vehicles transporting more than one person. In addition, numerous uncounted visitors enter the park each day via pedestrian and bicycle modes. Park officials estimate the 2000 annual visitation at 2,660,000 persons (NPS 2000a).

The number of vehicles entering the park increased rapidly until the mid- 1990s. Because of concerns over water quality, park use over the last decade has gradually shifted from a primarily river- based experience to terrestrial- based. As a result, traffic entering the park has decreased 27 percent from 1995 levels (NPS 1995b). However, as population in the area increases and water quality continues to improve through watershed planning programs, increased attendance is anticipated.

The park frequently experiences parking shortages, particularly at the southern areas that receive the highest visitation. Parking problems have been reported at Palisades, Cochran Shoals, Johnson Ferry, Gold Branch, Vickery Creek, Island Ford, and occasionally at Jones Bridge (NPS 1998c). The most severe parking shortages occur at Cochran Shoals, which contains approximately 150 parking spaces but experienced over 520,000 vehicles in 2000 (NPS 2000a). In 1995, over 1,000,000 vehicles were counted at Cochran Shoals (NPS 1995b), so an apparently considerable latent demand to use this area is hampered, at least in part, by lack of parking



facilities. Park officials report that visitors sometimes wait 30 minutes or more for a parking space, or may choose to park illegally on the park access roads or on nearby public roads (NPS 1998a).

Visitation is greatest during the late spring and summer months, according to the traffic counts collected by the National Park Service. Vehicles accessing the park during this period approximately double the visitation during the winter months. Parking shortages occur more frequently during peak visitation periods than during low visitation periods (NPS 1998a).

Limited parking facilities and the abundance of nearby residential neighborhoods encourage many visitors to walk or bicycle to the park. In areas adjacent to or near residential developments, such as Island Ford, McGinnis Ferry, Johnson Ferry, Vickery Creek, and Palisades, informal access trails between neighborhoods and the park have been formed by frequent pedestrian and bicycle “short-cut” traffic.

The Chattahoochee Outdoor Center, located at Johnsons Ferry, previously provided transportation within the park for their patrons on river paddling trips. However, the Outdoor Center ceased operations in the fall of 2001. No other transit service is currently provided within the park.

Pedestrian/bicycle/vehicle conflicts are another problem reported by park officials. In park areas such as Island Ford and Jones Bridge, joggers and walkers often choose to use the edge of the 21-foot-wide winding access road instead of the trails. As they round a curve, motorists may encounter a bicycle or pedestrians walking two or three abreast on the roadway. Motorists traveling at excessive speed are also a problem in these park areas. A traffic calming study is currently under way to identify measures to slow the motorists and separate pedestrians from the vehicular traffic.

VISITOR AND COMMUNITY VALUES

Traditional Park Character and Visitor Experience

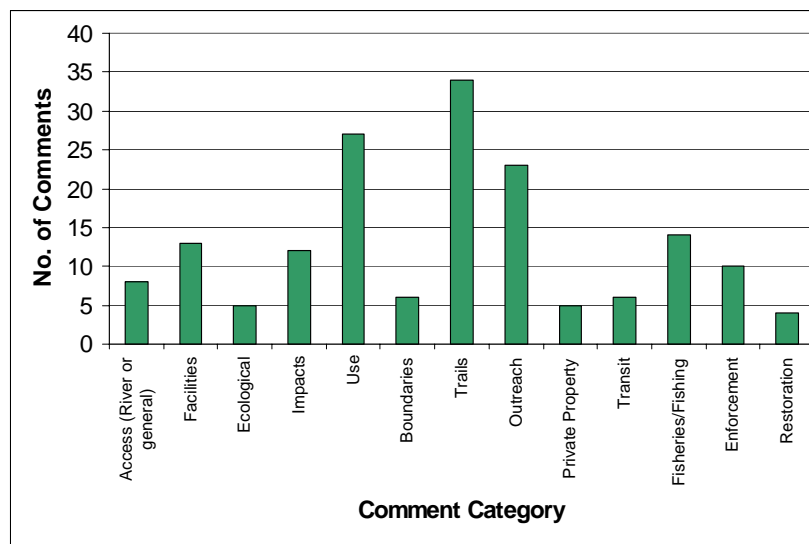
Traditional park character and visitor experience are included as an impact topic based on the criteria presented in “Impact Topics – Resources and Values at Stake in the Planning Process” in the “Alternatives” section.

The enabling legislation of the park provides for the protection and preservation of the natural, scenic, recreational, and historic values of the river. The existing park provides access to natural river corridor settings at 16 different locations for millions of people in the Atlanta area. The newly expanded boundaries of the park offer even more areas for visitor experiences. Visitors come to the park for the scenery and the other sensory experiences that accompany the river and associated forested areas. They enjoy such features as the changing seasonal colors, scents of the forest, sounds of water and wildlife, solitude, and quiet. Some areas of the park offer more active opportunities for recreation, such as hiking, horse back riding, biking, and boating.

Scoping for the general management plan obtained information about visitor issues, experiences, and concerns for the future through a series of public meetings and a public comment period. Public input identified 168 community issues, which were sorted by type into the 13 categories illustrated below.

More responses addressed the value of recreational trails (jogging, biking, hiking, and for access to fishing) than any other issue, followed by experiences and concerns related to land use and the need for more outreach/public education about park facilities.

The following chart and Table 15 summarize the detailed nature of public comments on visitor-related issues associated with management of the park.



Summary of Public Comments Received during Scoping

Table 15: Summary of Issues Raised during Public Scoping

Comment Category	Nature of Comment
Outreach	Increase environmental education and outreach of park to surrounding communities
Private Property	Conflicts between private property owners and park on acquisitions
Transit	Improved traffic and safety, improved parking and roads, better transportation system
Fisheries/Fishing	Improved fisheries management, to include emphasis on resource protection/long term maintenance
Enforcement	More stringent enforcement of water quality laws, safety, legal rules in park
Restoration	Restoration of damaged or disturbed areas of the park to be restored and enforcement of relevant regulations
Access (River or general)	Increased access and types of visitor experiences
Facilities	More or less varied support, recreational and educational facilities
Ecological	Increased protection of natural ecological features of park
Impacts	Water quality, fisheries protection, water quantity, point and nonpoint pollution, noise
Use	Increased multiple use, but with protection of natural resources
Boundaries	Expand park as much as possible, connectivity
Trails	More and different types of trails



This outreach program helped create a dialogue with park visitors on visitor and community values. During the scoping program, the park received a high overall approval from the public. There was also consistency in the nature of public concerns and the desired visitor experiences.

To further assess these values, information obtained from park visitors during the 2000- 2001 public scoping was compared to the park Visitor Survey Card Data Reports of 1998, 1999, and 2000. These reports showed a reduction in overall satisfaction with conditions at the park from 85 percent to 81 percent between 1998 and 2000. Citizens commented on the severe strain on park infrastructure due to growth and development trends in the Atlanta metropolitan region. They also called for more park facilities, raised the need for more NPS staff to address enforcement of park regulations, and expressed concern over conditions of the river caused by forces outside the boundaries of the national park itself, i.e., “the river was brown, it was hard to enjoy our raft trip” (NPS 1998a).

Comments reflect the fact that visitation is primarily local or regional, but also express the universal popularity of the park, the use of the river as a drinking water supply, and the role of the river-based park to serve as a buffer to provide clean water. The park in fact provides the largest single public green space in the metropolitan Atlanta region, and the river supplies 70 percent of the metropolitan Atlanta area’s drinking water.

Recreational Opportunities. The park offers visitors a wide variety of ways to experience a range of natural and cultural resources. Scenic views and natural settings range from rugged expanses of forest with little human disturbance to landscapes from the historic and archeological past. The visual respite from rapidly developing urban and suburban surroundings draws almost 3 million visitors each year (NPS 2000e).

The park offers visitors a variety of recreational opportunities, including:

An extensive system of hiking, jogging, and bicycling trails

River access points for activities such as fishing, swimming, motorized boating, canoeing, rafting, tubing, wading, and kayaking

Numerous picnic areas

Open spaces and natural habitat areas for scenery enjoyment and wildlife viewing/bird watching

Nineteenth- century historic sites and Native American archeological sites

Because the concessioner at Johnson Ferry has seen declining revenues for water related rentals since 1996, the facilities there will close. The park is in the process of requesting approval for a study of concessioner options for this site, which would involve a land appraisal of the Johnson Ferry real estate and building. The study would also review the potential cost for different uses at this highly visible location, including replacement concessions, park offices, elimination of facilities, limited facilities, or new information and interpretative facilities. The Johnson Ferry Unit location in Cobb County has emerged as the focus of major federal- and county- funded infrastructure improvements, including bridge and road widening of Johnson Ferry Road/Abernathy Road and expansion of the Cobb County water plant adjacent to the park. As summarized in an environmental assessment prepared by the park, Johnson Ferry Road is one of the busiest arterial highways in the Atlanta region and the location of the only bridge to connect Fulton and Cobb Counties.

Table 16 summarizes the current recreational amenities offered in the park.

One of the primary recreational values expressed by visitors was the desire to achieve a sense of solitude within natural areas of the park. This requires a low- noise environment, an absence of unwanted sound. Sound is easily measured with instruments, but variations in human responses to sound complicate understanding of its impact. People judge the relative magnitude of sound by subjective terms such as “loudness” or “noisiness.”

Table 16: Principal Recreational Amenities Summarized According to Park Unit

Park Area	Swim	Canoe	Kayak	Ramp Access	Motor Vessels	Fishing	Other
Bowmans Island		X		X ^{a/}		X	
Settles Bridge						X	
McGinnis Ferry						X	
Suwanee Creek						X	
Abbotts Bridge		X	X	X	X	X	
Medlock Bridge		X	X	X	X	X	
Jones Bridge	X	X	X	X ^{b/}	X	X	
Holcomb Bridge		X	X			X	
Island Ford		X	X	X		X	
Vickery Creek		X				X	
Gold Branch						X	Wildlife ^{c/}
Johnson Ferry		X	X	X		X	
Cochran Shoals	X					X	Birding ^{c/}
Powers Island		X	X	X		X	
Palisades	X					X	

a/ Corps of Engineers ramp

b/ step- down ramp

c/ may occur at any unit, but common in areas noted.

Source: NPS 2000e

Low- noise environments can be achieved in many parts of the park, but because the park is located in an urban/suburban metropolitan area, the amount of noise varies greatly across different areas of the park and even locally within individual areas. Visitors seeking a recreational experience in the park are exposed to a variety of noise generators, primarily vehicular traffic on bridges, along roads, and in parking lots adjacent to park property. Hikers, boaters, or fisherman, depending on their proximity to these sources, may hear noise from vehicles. The densely forested areas in many parts of the park, however, serve to dampen vehicular noise, providing a sense of solitude largely absent of road noise. Areas such as the Palisades, for example, are especially effective at damping noise, even though they are located close to major arterials such as I- 75 and I- 285.

Regional County and Municipal Park Planning Linkages. Surrounding communities in Forsyth, Fulton, Gwinnett, and Cobb Counties have initi-

ated active recreational programs to complement the more natural types of activities of the park. An inventory and assessment of park planning in adjacent counties provides a comprehensive understanding of the potential for connectivity to existing and proposed local parks, for addressing gaps in service delivery, and for identifying potential duplication of recreation services:

Forsyth County prepared a unified development code that supports park- like environments. The county is using Georgia Greenspace Program funds to purchase permanent open space.

The **Gwinnett County** park and recreation plan calls for park and green space investments in riverfront land purchases and trails, using county funds and state Greenspace Program funds. The green space plan targets the purchase of 20 percent of the county land designated for permanent open space. A 2001 referendum approved implementation of the



park plan. The county also created the western Gwinnett bikeway plan.

The **City of Duluth** prepared and funded the Chattahoochee River greenway plan to link NPS property and a state park adjacent to Abbotts Bridge Park to the south. The city also obtained federal Transportation Efficiency Act grants for the restoration of Rogers Bridge across the Chattahoochee River as a multi-use trail. According to the green space plan, this trail will tie into the western Gwinnett bikeway and to proposed trails in Fulton County on the opposite side of the river.

Fulton County initiated a master plan for county parks in 2001. Local communities and stakeholders adjacent to the NPS units have negotiated individual agreements for equestrian use of sites, trails, fishing, maintenance, and water quality monitoring. The county applied for Transportation Efficiency Act funding for participation in the Rogers Bridge project.

The **City of Atlanta** is updating the master plan for parks and recreation and is participating in the Georgia Greenspace purchase plan.

The **City of Roswell** updated the plan in 2000. A referendum held in 2000 included funding for parkland purchases of over \$22 million. The park and recreation plan calls for connections to the NPS units at Island Ford and Vickery Creek. Roswell's plan includes active sculling uses, expansion of the Chattahoochee Nature Center, trails, and parking facilities.

Cobb County plans for the Silver Comet Trail to intersect the park. Initiated by the Path Foundation, contractors have built the Silver Comet Trail along 38 miles from Smyrna to Rockmart over the path of the abandoned Seaboard Railroad line. The multipurpose trail is designed to move bikers and joggers through the western metro region. State, federal, and local funds are being used to fund this \$9.5 million project. Cobb County and local neighborhoods were approved for Transportation Efficiency Act funds to plan river area connectivity to the

national park from Johnson Ferry area subdivisions.

Visitor Profile. Most visitors are residents of the Atlanta metropolitan area. However, because it is a national park, people from all over the country who visit the Atlanta area also visit the park. The park's recreational visitors come from a wide variety of ethnic, racial, and economic backgrounds representing many groups from the adjacent neighborhoods and society at large.

Visitors come to the park for a wide variety of reasons, including viewing scenery, walking, hiking, jogging, bicycling, wildlife viewing/bird watching, communing with or studying nature, studying history, picnicking, and water sports (NPS 2000e). The length of a visitor's stay depends on the purpose of the visit; a jogger may only stay an hour while a picnicker may stay all day. Many visit the park on a regular or frequent basis.

Park staff collects annual visitation statistics for the park. Visitation estimates are developed using traffic counts. Monthly public use is recorded and reported. Table 17 presents the annual visitation at the park from 1991 through 2000 (NPS 2000d).

Table 17: Annual Visitation 1991 – 2000

Year	Annual Visitors
1991	1,660,563
1992	2,325,277
1993	2,844,674
1994	3,472,026
1995	3,457,002
1996	3,540,375
1997	2,957,698
1998	2,935,043
1999	2,898,155
2000	2,659,709

Source: NPS 2000d

The National Park Service estimates that recreation visits in 2001 and 2002 will be 2,451,934 and 2,269,846 respectively (NPS 2000d).

Visitation Trends. Recreational visits to the park more than doubled from 1991 to 1996, from

1,660,563 to 3,540,375. This increase is attributed to the growth of population in the region and the popularity of the river corridor as a recreation area, particularly for rafting and fishing. The counties that border the river had individual population growth that ranked in the top 20 nationally between 1991 and 1996 (Forsyth and Gwinnett tied for first, Cobb was 16th); north Fulton cities Roswell and Alpharetta ranked first and third, respectively, among cities. The Atlanta region was rated the fourth fastest growing metropolitan area in the United States from 1990 to 2000.

In the last few years, however, documented visitation has incrementally decreased (Table 17) despite this record-breaking population growth. The following factors may have affected visitation trends in the park in recent years:

Water Quality: One explanation of the decline in visitation may be public perceptions concerning water quality. During this era of booming growth, the Chattahoochee River corridor became a desirable place to live, leading to sprawl along the river corridor. Poor development practices and weak enforcement of existing local and state regulations that protected the river buffer and tributaries from run off and nonpoint pollution in the adjacent counties produced water quality concerns in the watershed. The Chattahoochee River was listed in the top 10 most endangered American rivers in 1999 (for additional details, see the “Water Quality” subsection). The extensive media coverage of the pollution clearly affected perceptions of the desirability of the river as a recreational resource and may have contributed to the reduced rate of visitation of the park for boating, rafting, and fishing.

Change in Visitor Experience from Water-based Uses to Land-based Uses: The metropolitan population rose from approximately 2.5 million in 1990 to over 4.1 million in 2000. However, the number of visitors who rafted the river dropped precipitously beginning in the mid- 1990s, according to NPS rafting vendors (NPS 2000e). This decline in the number of water-oriented users has been attributed to the declining water quality (NPS 2000e). This period, however, has seen a

has seen a significant increase in biking and jogging, as documented in the annual NPS visitor surveys (NPS 2000e).

Change in Access Patterns to the Park

Units: Regional traffic congestion, new patterns of access to the park, and changing visitor uses in different areas of the park suggest a new visitation trend. The typical visitor experience is currently more oriented toward walking, jogging, biking, car- pooling, and using social trails. This trend suggests the need for a new method for surveying and tracking visitor use, as those that access the park as pedestrians or bicyclists are not always included in the visitor count, artificially lowering total visitors reported.

Aesthetics/Viewsheds. The Georgia Metropolitan River Protection Act of 1973 includes language that allows the National Park Service to protect park aesthetics and viewsheds in the vicinity of the park. The Atlanta Regional Commission designed the act to protect river quality and visitor experiences in the national park, and to improve development controls in the Chattahoochee River watershed. The act established a 2000- foot- wide corridor on both banks of the Chattahoochee River for the entire length of the park. In 1998, the Metropolitan River Protection Act Corridor extended 36 additional miles to the downstream limits of Fulton and Douglas Counties. The act required the Atlanta Regional Commission to adopt a plan that would result in protection of the land and water resources of the Chattahoochee River Corridor, and to develop procedures to implement the plan and the act. Local governments in the corridor have the responsibility to implement the plan.

The Metropolitan River Protection Act makes it illegal to engage in any land- disturbing activity not in compliance with or not certified under the Chattahoochee Corridor Plan. This includes restricting any land clearing activity within a 50-foot buffer of the river and prohibiting impervious surfaces within 150 feet of the river. In addition, it requires a 35- foot vegetated buffer along tributaries to the Chattahoochee River, and precludes any land or water uses within the floodplain. When enforced, these provisions help protect the viewshed along the river corridor.



Proposed developments adjacent to the national park increasingly concern area residents, park visitors, and adjacent property owners. Visitors identify aesthetics and viewsheds of the park and the river corridor as important issues. The principle reasons for park visitation are to appreciate the beauty and serenity of the natural environment. As a result, one NPS objective is to allow views of the park and Chattahoochee River corridor from the outside but to ensure that high rises and nearby developments are not obvious from inside the park.

No county or city governmental jurisdiction other than the Metropolitan River Protection Act provides controls or guidelines for protection of the park viewsheds. However, the Cobb Galleria Community Improvement District, which incorporates 25,000 acres of landmass in the vicinity of the Palisades and Cochran Shoals, provides an effective means of improving visitor experience at site-specific developments and for leveraging private sector voluntary support for aesthetics and viewshed protection. In a unique public-private partnership, the district negotiates for joint funding of trails, amenities, and park area improvements in exchange for height and density waivers.

Community Characteristics

Community characteristics are included as an impact topic based on the criteria presented in “Impact Topics – Resources and Values at Stake in the Planning Process” in the “Alternatives” section. Community characteristics include population, land use, and economics.

Population

The Atlanta metropolitan area is one of the most rapidly growing areas in the United States. Population growth and urbanization in the area around the park are increasing rapidly, and the demands on the park can be expected to increase accordingly. According to the United States Census Bureau, the population of the 21-county Atlanta Metropolitan Statistical Area passed 4.1 million in 2000, ranking it fourth in the nation for numeric population change since 1990. Within the Atlanta Regional Commission jurisdiction of ten counties, the 2000 census population was 3,429,379. The four counties that include the park had a total population of

2,110,602 in the 2000 census (U.S. Census Bureau 2000), representing over half the metropolitan statistical area population.

Population growth from 1980 to 2000 for the ten-county Atlanta area was fastest in the vicinity of the park. The north-northeast area of the region includes the upper Chattahoochee River watershed and is the fastest growing area in Metropolitan Atlanta, with 174,623 new residents. The north-northeast area impacts over half the park, especially the Forsyth and North Fulton components. The second fastest growing area of the region is the north-northwest area or I-75 corridor. This population expanded to 149,507 residents, and was previously the fastest growing region of the metropolitan area. The north-northwest population trends affect the park’s western units from I-75 to I-285 westbound.

Gwinnett, Cobb, Fulton, and Forsyth counties were among the fastest growing counties in the Metropolitan Atlanta Statistical Area during the 1990s, accounting for the majority of the Atlanta area’s growth. By 2025, the population is projected to grow another 36 percent to 3,293,000. The population growth from 1990 to 2000 for the region in the vicinity of the park is summarized in Table 18 (U.S. Census Bureau 2000).

Population density varies along the corridor of the park. In general, population is less dense to the north (1990 population density of 96 people per square kilometer in the Big Creek Watershed) and denser in urban areas to the south (1990 population density of 1,050 people per square kilometer in the Rottenwood Creek watershed) (NPS 2000e).

Land Use

Local governments in Georgia, such as counties and incorporated municipalities, have responsibility for land use management and water quality protection. Their roles include master planning, zoning enforcement, storm water ordinance control, and water and wastewater planning. The U.S. Army Corps of Engineers, Mobile District manages the Buford Dam and Lake Lanier, located at the northern end of the park. The Corps of Engineers plays a key role in the management of the park through its control of river flow (NPS 2000e). The National Park Service increasingly participates on

Table 18: Population Growth in the Metropolitan Atlanta Area from 1990 to 2000

County	Population		Change in Population	
	1990	2000	Numeric	Percent
Gwinnett	352,910	588,448	235,538	66.7
Fulton	648,951	816,006	167,055	25.7
Cobb	447,745	607,751	160,006	35.7
Forsyth	44,083	98,407	54,324	123.2
Atlanta MSA	4,112,198	2,959,950	1,152,248	38.9

Source: U.S. Census Bureau (2000)

various commissions and boards dealing with land use issues, sprawl, smart growth, park planning, zonings by county and by cities, and regional and state studies of land use trends and their affects on local development and quality of life.

The four heavily populated counties of Cobb, Forsyth, Fulton, and Gwinnett are involved in land use planning activities that also affect the park. All four counties are required by State of Georgia Land Planning enabling legislation to prepare comprehensive plans for management of land use, infrastructure, and the financing of implementation of those same plans. Land use planning for each county along the Chattahoochee River is also specifically protected by Metropolitan River Protection Act requirements (also discussed in the “Aesthetics/Viewsheds” subsection).

Park units about the cities of Atlanta, Duluth, and Roswell, and are relatively close to Alpharetta, Buford, Suwanee, and Cumming. Atlanta’s Standing Peachtree Creek area has a municipal water facility and historic land uses that include mill and Fort Peachtree properties. Older Atlanta neighborhoods and industrial uses are the predominant land uses along the park boundaries. Resolution of the multi- year lawsuit on wastewater and storm water disposal from the City of Atlanta has prompted plans to purchase tributary buffers along the Chattahoochee River and the river itself as a means of improving water quality. The City of Roswell and the City of Alpharetta have combined to create citywide linking green belts along the Big Creek tributaries.

Municipalities that directly connect to the park have often taken leading roles in land use planning. The City of Roswell comprehensive plan provides an award winning park and recreation plan, an Adopt- A- Stream program, and land use buffer systems beyond state minimums. The Gwinnett cities of Buford and Suwanee have approved new funding for open space purchases to support implementation of their comprehensive planning efforts. Duluth was an early leader in the formation of groups that supported the initial development of the park.

The Atlanta Regional Commission, the North Georgia Regional Water Authority, the Georgia Department of Natural Resources, and the new Georgia Regional Transportation Authority play active roles in natural resource management, environmental assessment, watershed protection, and land use planning. New land use enforcement efforts are geared towards large land use developments called Projects of Regional Impact. Guidelines for these projects have recently been approved to provide wiser choices regarding compact growth, transportation alternatives, and green space protection. The state and regional agencies continue to expand enforcement and protection responsibilities in land use development activities. In addition, various community- based organizations and stakeholders have influenced in resource management (NPS 2000e).

Land use in the northern end of the park and vicinity is primarily characterized by rapid population growth and urban sprawl. Urbanization has converted approximately half of the land in the vi-



cinity of the park from agricultural or forested uses to residential, commercial, industrial, or other more intensive uses. Development has followed the major transportation corridors (I- 75, I- 285, Georgia 400) and includes high- rise buildings, industrial sites, subdivisions, and highway expansions (NPS 2000e). The National Park Service has increasingly focused on these transportation corridors because of runoff and watershed issues related to intense new developments in these key economic corridors.

The southern end of the park, including the City of Atlanta and parts of Fulton County, is the most densely developed area. and the most heavily used by visitors. The northern portion of the park still contains some open fields and forests, and Forsyth County has large pockets of rural land uses and horse farms. However, development is increasing as urbanization sprawls northward (NPS 2000e).

The park can serve as a green or open- space buffer for the entire region, bringing form to the land use patterns of the region. The density of land uses tends to increase as the distance from the park increases. In general, the park covers about a ¼-mile wide core area on each side of the river. Residential neighborhoods continue outward to ½ mile, and mixed uses to 1 mile.

This approximate ¼ mile width of the park is a community characteristic that planners refer to as the “walking distance.” This core area is the least developed, with notable exceptions in the southern portion of the metro region, where industrial land uses and mill housing were developed earlier in the 20th century around Atlanta proper.

Up to ½ mile beyond the park boundaries, the neighboring area has various densities of residential development. Existing land uses are primarily single family residential except at key hubs near major traffic interchanges or intersections. These major activity centers involve a mix of non-residential and residential land uses, as on the Georgia 400 Corridor at Northridge and at locations along the I- 285 perimeter highway near Cumberland Mall.

The 1- mile distance represents the approximate limits of a nexus of land use planning and conditions that can buffer the park. Stream buffers

throughout the watershed are protected under local and state authority. The core park area land, the residential ring, major activity centers, and industrial, apartment, and office land uses make up the overall layering of land use patterns.

Economics

The park corridor abuts some of the wealthiest areas of metropolitan Atlanta. The average household income in the Roswell Communities, for example, is estimated at over \$100,000 per family. The combined real estate value of parcels in close proximity to the park has been estimated at approximately \$15 billion (Trust for Public Land 2001). Comparisons of waterfront and parkfront properties to non- park parcels show significantly higher values for properties adjacent to rivers and parks. For example, properties and lease rates for New York City real estate facing Central Park, an 1800 acre green space, are as much as 40 percent higher than average rates. The economic value of the national park to the metropolitan Atlanta region has not yet been quantified.

The Atlanta region has a growing office and employment market due to geographic location, private sector planning, and telecommunication innovators such as Lucent Technologies and Bell South. An estimated 28 fiber optic cable systems converge along two major fiber corridors, the most in the United States. In the metropolitan area, business real estate trends are measured by economic growth in sub markets. Downtown Atlanta has grown 24.1 percent in, the Central Perimeter 25.2 percent, north Fulton 18.8 percent, midtown Atlanta 14.4 percent, Buckhead 12.5 percent, and south Atlanta 5.0 percent.

The most appropriate economic submarkets in the park watershed are north Fulton and the Central Perimeter. In the Chattahoochee River watershed, the north Fulton County submarket encompasses most of two important counties that contain park properties: Forsyth County and north Fulton County, including the cities of Roswell and Alpharetta. This area contains 18.8 percent of the rentable office space for the entire Atlanta region, according to CoStar Real Estate Group 2001 projections.

The four- county area contained 1,231,000 employees in 1990, growing to 1,578,000 employees in

2000. Projections for 2025 estimate that 2,206,000 persons will be employed in the area; this represents a growth of 40 percent over the 2000 employment base (Atlanta Regional Commission 2001a). Even with the 2001 downturn in the national economy, the north Atlanta submarket economic environment is expected to be strong, and development along the park corridor is expected to continue. This trend will mean continued pressure on development within the Chattahoochee River watershed and on the fragile environs of the narrow band of park habitats that wind through the north Fulton and I- 75/I- 285 areas of the region.

Park revenues reflect these economic trends. Fees from parking permits and related sources are estimated at \$553,178 for fiscal year 1999, up from \$437,243 in 1998 and \$198,680 in 1997. The climbing revenues indicate a substantially increased demand on the parks, parking lots, trails, restroom facilities, interpretative activities, security, and related services.

